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A MANUAL

OF

MIDWIFERY.

BY

ALFRED MEADOWS, M.D., LOND., F.R.C.P.,

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HONORARY FELLOW OF THE OBSTETRICAL
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PREFACE TO THE THIRD EDITION.

In preparing another edition of this work, the second having been a long time out of print, I have endeavored to keep steadily in view the object aimed at in the last edition, viz., while preserving one essential character of the work as a Student's Manual, to make it also a handy book for the busy practitioner. The main plan of the work remains the same; but much new matter has been added, chiefly of a practical character, though some additions have also been made to the chapters on the anatomy and physiology of the parts concerned. I have also added upwards of sixty drawings, thereby, as I hope, enabling the student the more readily to understand some of the more difficult points either in the theory or the practice of Midwifery.

I am conscious that the work falls far short of being what I would wish it to be; but if it helps forward the scientific study, and facilitates the successful practice, of Midwifery, my chief object will have been attained.

27 George Street, Hanover Square.
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PREFACE TO THE SECOND EDITION.

In my Preface to the First Edition of this work I expressed a hope that the book would be found useful to the student in facilitating the study of Midwifery. That hope has been abundantly realized, as I have good reason to know. In the present edition I have endeavored, without any sacrifice of its character as a Student's Manual, to make the work of at least equal value to the practitioner. I trust it may prove not less successful in this respect. I have aimed especially at representing the subject in as concise and convenient a form as is practicable, consistent with its importance.

While maintaining the same general plan, the work has been carefully revised throughout, and much new matter has been added; chiefly in those chapters which relate to practical Midwifery; as, for instance, in the Part which treats of the various Obstetric Operations, in which an entirely new chapter on Cephalotripsy has been added, and also in the several chapters devoted to the consideration of the many forms of Unnatural and Complex Labor. My object being especially to enhance the value of the work as a practical treatise, though in a small compass, in the hope that it may be additionally useful to the busy practitioner. For this purpose also, and for facility of reference, I have made both the Table of Contents and the Index more complete and full.

Another new feature in this edition is the insertion of upwards of ninety wood engravings. These, I hope, will facilitate the study of the subject, and make its practical application easier. In the execution of these drawings I have thought less of their artistic merit than of their fitness to represent the points I wished to illustrate. They are therefore somewhat larger, perhaps, than might be thought to accord with a work of this size; but the obvious gain—clearness of expression, if I may use the term—will, I trust, compensate for that apparent defect.

It may be convenient here briefly to sketch the plan by which the subject of Midwifery is considered in the following pages. In the first place, as there is a science as well as an art of obstetrics, not only should the student be familiar with the *practical* part of obstetrics, but, for the better appreciation of this, he should also to a certain extent study its *theoretical* bearings. Hence the physiology of gestation and parturition will be found to occupy a not unimportant part in these pages.

As the student who studies Midwifery in the order set forth in the prescribed curriculum, will of course have gained a knowledge of the *Anatomy of the parts concerned in Gestation*, I have only thought it necessary to consider this part of the subject so far as it is of special interest to the obstetricist. The physiology of *Conception and Gestation*, with the *Development of the Ovum* from the time it leaves the ovisac to its full maturity, together with the *coincident changes occurring in the uterus*, are subjects requiring a fuller consideration, more especially as they are not unfrequently introduced into professional examinations. I trust the way in which these matters are here treated will be found convenient for the remembrance of their leading features. All this will be comprised in the First Part.

The Second Part embraces the whole subject of *Pregnancy*, its *Signs and Symptoms*, its *Duration* and the various deviations from what may be called normal pregnancy, either as regards the embryo itself, the organ containing it, or the position they severally occupy, as in the various forms of *Extra-Uterine Gestation* on the one hand, and of *Displacements of the Gravid Uterus* on the other.

The Third Part considers *Natural Parturition*, the *Classification of Labors* which I have adopted, and the *Phenomena* and *Management of Natural Labor.*

The Fourth Part brings under review the various *Obstetric Operations* which are not required in Natural Labor, but which are necessitated by the different emergencies described and illustrated in Parts V and VI under the heads of *Unnatural* and *Complex Labor.* In bringing before the student the subjects treated of in the last three Parts, in the order thus indicated, he will first acquire a knowledge of the means which the obstetric art places at his command, and then he learns the circumstances which render their employment necessary.

Lastly, some of the principal *Diseases of the Puerperal State* are described in Part VII. These are, I hope, treated in such a manner as to impress upon the mind of the student the leading characteristics which should awaken attention at the bedside.

27 George Street, Hanover Square.

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PART I.

ANATOMY AND PHYSIOLOGY OF THE ORGANS OF GESTATION.

CHAPTER I.

THE PELVIS.

As the groundwork of all obstetric knowledge, it is indispensably necessary that the student should possess an intimate acquaintance with the anatomy and physiology of the organs of generation, and especially of the pelvis. Nothing so much facilitates the *study* of midwifery, and no surer basis exists for success in the *practice* of it, as a clear and accurate idea of the size, form, and relations of the pelvis and its contents; hence the appropriateness of commencing a work of this kind with a consideration of these parts.

This bony basin (as its name implies) is situate between the spinal column above, and the lower extremities below, which latter are attached to it by muscles and ligaments. In very early life it is composed of fourteen or sixteen separate portions; but at the age when an acquaintance with its leading features claims the special attention of the obstetric practitioner, it consists only of four; two of these, the *sacrum* and the *coccyx*, form its posterior wall; and two, the *innominata,* form the anterior and lateral walls.

It is divided into two parts, the *True* and the *False Pelvis;* the latter is formed exclusively by the alæ of the ilia, which spread out laterally and posteriorly from the margin of the brim of the true pelvis, upwards, outwards, and backwards, to support the abdominal viscera, and to give attachment to muscles forming the abdominal wall; in front it is entirely deficient. It presents little of importance in a practical point of view to the obstetrician: it is separated from the true pelvis by the *linea-ilio-pectinea.*

The *True Pelvis* is formed by the union of the sacrum and coccyx behind; by the pubes in front; and by the ischia on either side; the pubes, ischium, and ilium of each side uniting in adult life to form one large irregularly shaped bone, the *os innominatum* (Figs. 1, 2). All these bones and their attachment to one another may now be separately considered preparatory to a study of the pelvis as a whole.

The *Pubis* (*a*, Figs. 1, 2) is the smallest of the three bones: it is situated in front, and possesses a *body* or *base*, which enters into the composition of the acetabulum; a *horizontal portion*, or ramus (*i*, Fig. 1), running forwards and inwards, which forms part of the pelvic brim, on which anteriorly is situated the *spine* of the pubis, which gives attachment to Poupart's ligament; and a *descending portion* (*c*, Figs. 1, 2) or ramus, which is directed downwards, outwards, and backwards, and which, uniting with the ascending portion of the ischium (*k*, *k*), forms with the same parts on the opposite side the *pubic arch.* The two pubes are united together in the middle line by a firm fibro-cartilage (*e*, Fig. 2), constituting the *symphysis pubis.*

FIG. 1.

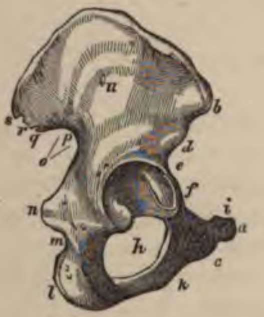
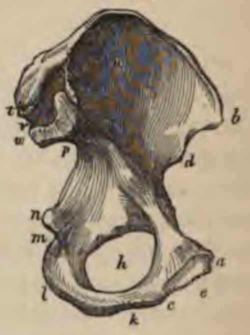


FIG. 2.



The *Ischium* (*l*, *l*, Figs. 1, 2) is the next in size and the lowest in position: it consists of a *body* or *base*, which contributes largely to the acetabulum, uniting there with the two other bones,—the pubis and ilium; a *spinous process* (*n*, *n*, Figs. 1, 2) projecting backwards and inwards from below the body, or base, of the bone; a *tuberosity* (*l*, *l*), which is the most depending portion of the bone, and is that on which we sit; and an *ascending portion*, or ramus (*k*, *k*, Figs. 1, 2), which rises obliquely upwards, forwards, and inwards, to unite, as before said, with the descending portion of the pubis to form one side of the pubic arch. If we examine the inner surface of this bone, we shall observe a line, or ridge, extending from the pectineal eminence to the spinous process, and dividing this aspect of the bone into two parts, or planes, the one inclining towards the obturator foramen and the subpubic arch, the other to the great ischiatic foramen; the relations and arrangement of the soft parts make the inclination of these planes still more distinct and definite. It is important to remember this in relation to the mechanism by which the head of the child is rotated in its passage through the pelvis.

Between the several rami of the pubis and ischium assisted also by other portions of these two bones, is a large oval or triangular aperture, the *obturator foramen* (*h*, *h*), which, in the recent state, is covered in by a membranous ligament, and the chief object of which is to impart greater lightness to this part of the pelvis, while, at the same time, it allows of the attachment of muscles.

The *Ilium* is the largest and the highest in situation of the innominate bones: its outer surface, called the *dorsum* (*u*, Fig. 1), is rough, for the attachment of the gluteal muscles; its inner surface (*u*, Fig. 2) lodges the iliacus internus; the *base*, or *body*, of the bone contributes to the acetabulum; and, springing from this, the broad *ala* projects upwards, outwards, and backwards, to form the cavity of the false pelvis; behind and below the body of the bone, and the posterior *spinous processes* (*s*, *r*, *q*, Fig. 1), is a large notch, the *sciatic notch* (*p*), which in the recent state is divided into two parts by strong ligamentous bands. Posteriorly, the ilium presents a broad, irregular, ear-shaped surface (*w*, Fig. 2), which is united to the sacrum, by a firm fibro cartilaginous union, to form the *sacro-iliac synchondrosis*. Between the body of the bone and the ala is a prominent ridge, constituting a part of the brim of the true pelvis, the *linea-ilio-pectinea*.

The three bones just considered, it will be seen, do not all take equal parts in the formation of the true pelvis: for instance, the ilium forms part of the brim, but none of the outlet; the ischium part of the outlet, but none of the brim; while the pubis shares in both. In consequence of this arrangement, deformity of the pubis affects both brim and outlet; while in deformity of the other bones, either the brim or the outlet would alone be affected.

The *Sacrum* (Figs. 3, 4) is a large pyramidal-shaped bone formed of several vertebræ which have coalesced (*d*, *d*, Fig. 3). The base of the pyramid (*b*, *g*, Figs. 3, 4) is situated uppermost; it is broad and flat, and supports the vertebral column; at this junction it projects slightly forwards, and is capped by a firm, wedge-shaped intervertebral fibro-cartilage, which is much thicker in front than behind, projects a little in advance of the head of the sacrum, and is in truth, therefore, the point to which is given the name of the *promontory of the sacrum;* below this, the surface of the bone presents anteriorly a considerable concavity, which is called *the hollow of the sacrum;* it terminates below at the apex of the pyramid (*p*, Fig. 3), where the bone articulates with the coccyx. On the anterior surface of the sacrum are seen four openings on either side (*e*, Fig. 3) for the transmission of the sacral nerves. Laterally, this bone articulates by an almost immovable joint with the two iliac bones, the point of union being called the *sacro-iliac synchondrosis:* it is from this point posteriorly that the oblique diameters of the pelvis are measured. In the fœtus the sacrum consists of five, and occasionally of six pieces.

FIG. 3.

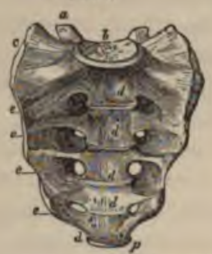
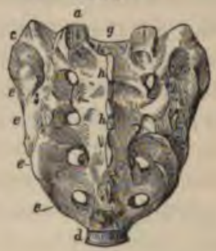


FIG. 4.



The *Coccyx* is the only distinctly movable portion of the bony pelvis; its cartilaginous connections with the sacrum, as well as with the three, four, or five portions into which it is divided, admit of a certain amount of movement—to the extent, perhaps, of about an inch, by which the outlet of the pelvis is increased in the antero-posterior direction. This bone, as a whole, is of pyramidal shape, with the apex lowest; it has some supposed resemblance to a cuckoo's beak, hence its name; the bones of which it is composed are imperfectly developed vertebræ. The coccyx is of considerable importance in labor, for if the joints which enter into its formation are anchylosed, or if its connection with the sacrum is of a like kind, a very serious obstruction arises to the passage of the head.

The various deformities to which the pelvis is liable, are, as I have already hinted, very unequally shared by the bones which enter into its formation; sometimes one bone or only part of a bone may occasion the deformity, at other times several bones are thus affected. The sacrum, for instance, may have its upper portion projecting too far forwards, thereby narrowing the conjugate diameter: this is the most common of all deformities. Or the same bone may be too straight on its anterior surface. Lower down, the os coccygis may be firmly united to the sacrum, or its separate portions may have ossified together, so as to form with the sacrum one inflexible curve; this difficulty is occasionally met with in women pregnant for the first time at an advanced age. Again, the pubes may have their arch narrowed by approximation of the descending rami: this retards considerably the exit of the head in the second stage of labor; or again, the same bones at their symphysis may have receded so as to diminish the antero-posterior diameter. Lastly, the ischium may be at fault (and when it occurs it is often a very serious one), by the spinous process being too long and projecting too far into the pelvic cavity; or, again, the tuberosities of the ischia may approximate too closely, so as to narrow the transverse diameter of the outlet.

Between the several bones which have now been considered, there are some very important *Articulations*, and there are also certain ligamentous structures which are deserving of attention from the practical obstetrician.

The *Symphysis Pubis* is the name given to the union between the two pubes in front. It consists of a thick layer of tough fibro-cartilage, firmly binding together the two apposed bones: before, behind, above, and below this are some very strong ligaments, which still further strengthen the joint, and limit, if they do not actually prevent anything like movement between the bones, even under the most violent uterine action. Probably the chief value of this joint is to enable the pelvis to resist sudden and violent shocks, which it does most effectually, and which would be felt severely if the pubic bones were ossified together. There is, however, some reason for believing that at every ordinary labor this joint separates to a certain though very limited extent;

changes take place in the pelvic articulations during the later months of pregnancy which seem to facilitate this movement, but the extent of mobility is very slight, and it probably adds little or nothing to the pelvic diameters.

The *Sacro-Iliac Synchondrosis* is formed by the rough and irregular lateral surfaces of the sacrum and ilium, which are united by a firm lamella of fibro-cartilaginous tissue; there is little or no movement allowed by it, and the joint is further strengthened by ligamentous bands passing between the two bones on their anterior and posterior surfaces. There are also two other ligaments of great strength, called respectively the *great* and *small sacro-sciatic ligaments*, which pass, the one (large) from the lower posterior spine of the ilium and from the sacrum and coccyx to the inner part of the tuber ischii: the other (small) passes from the side of the sacrum and coccyx to the spine of the ischium. The effect of these ligaments is to complete the ring of the pelvic outlet, and, at the same time, to narrow its postero-lateral dimensions.

The *Sacro-Coccygeal* joint is of simple hinge-like character, as are also the joints between the several portions of the coccyx, having anterior and posterior ligaments, with their fibro-cartilages interposed, and, in a few cases, a synovial membrane.

There is yet one other joint which is of some importance to the obstetrician—viz., the *Lumbo-Sacral:* this is formed by a layer of firm, tough fibro-cartilage, placed between the last lumbar vertebra and the sacrum. It is thicker in front than behind—wedge-shaped, as it were—and in reality is more prominent anteriorly than the sacrum itself.

In regard to the amount of movement which is possible between the several pelvic articulations during labor, Dr. Laborie has arrived at some important conclusions. Although it is very generally admitted that the pelvic articulations acquire a certain degree of mobility during labor, the value of this mobility is much disputed. All anatomists agree in regarding the sacro-iliac synchondrosis and the symphysis pubis as arthrodial joints; but Dr. Laborie, on the contrary, from investigations which he has made on the pelves of recently delivered females, believes that they present the characters—partly of enarthroses, the articulating surfaces being convex in one direction, concave in the other; partly of ginglymi, their movement being limited to one direction.

As regards the pelvic inlet, the influence exerted on parturition by the mobility of the pelvic articulations is undoubtedly very small; but when the child, having entered the true pelvis, fairly engages the outlet, then the mobility of the pelvic joints may play an important part, and the mechanism by which this outlet is enlarged is extremely simple. Inasmuch as the diameter of the outlet is in reality less than that of the inlet, some provision must be made in order that the child may perform the rather complex movement of evolution which takes place in the pelvis. Accordingly, the oblique and antero-posterior diameters are easily increased by the relaxation of the sacro-ischiatic ligaments, and the mobility of the sacro-coccygeal articulation; hence all the resistance is produced by the transverse diameter. Yet the pressure exercised by the forces which push the head towards the ischiatic tuberosities, is sufficient to widen the space. The articulations are relaxed by means of a force, which is the more powerful in proportion as its point of action is near the end of a long lever, represented by the entire distance between the ischia and the articulations. This lever is 128 millimetres in length, between the sacro-iliac synchondrosis and the tuberosity of the ischium; hence a separation of two millimetres at the lower part of the synchondrosis gives the end of the lever—that is to say, the transverse diameter—an additional length of nearly two millimetres, and there is, he says, reason to believe that this increase may be even greater. In primiparæ above thirty years of age, the mobility of the pelvic articulations may be destroyed, or greatly limited; hence the difficulty in labor is concentrated in the outlet of the pelvis, however well formed the woman may be. Such are the main conclusions arrived at by M. Laborie, and they no doubt represent pretty fairly the facts of the case.

At all events, it may be conceded that some movement certainly takes place during labor between the several pelvic articulations. Dr. Leishman, in his admirable *System of Midwifery*, argues strongly in favor of this view by reference to comparative anatomy, and he cites the case of the guinea-pig, where considerable movement is allowed between the symphysis pubis, and that of the cow, where the sacro-iliac joint yields very freely; in man, both probably give a little. Certain it is that patients often complain during the latter weeks of pregnancy, and still more after delivery, of a feeling of great relaxation and want of support about the pelvic joints: this is probably due rather to a kind of softening and relaxation of these ligamentous structures than to any actual movement between the bones themselves.

The Pelvis as a whole.—Thus constituted, the pelvis presents a firm bony basin, combining at the same time great strength with lightness. It is divided, as I have already said, into an upper and a lower portion—the *True* and the *False* Pelvis. The latter forms part of the abdominal cavity, being strong for the attachment of the muscles which form the abdominal wall, and helps to support the abdominal contents.

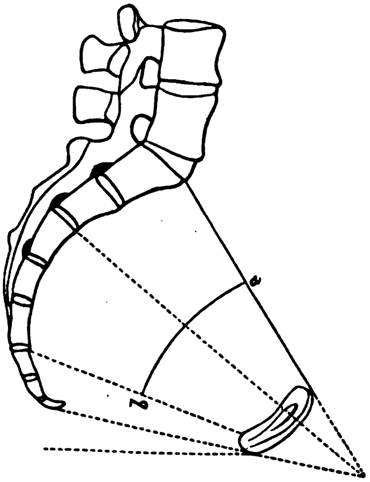
In the *True Pelvis*, regarded as a whole, we have especially to notice its *Brim* or *Inlet*, its *Cavity*, and its *Outlet*, their different dimensions, and the varying direction of their several planes, axes, or inclinations. A correct appreciation of all these is of the first importance in the study and practice of midwifery.

And first it should be noted that the dried pelvis scarcely represents the relations of the parts in the recent state: it may be well, therefore, briefly to call to mind the several structures occupying the pelvic cavity. In the first place, the obturator foramina are inclosed by firm, thin, fibrous membranes, perforated only for the passage of nerves and bloodvessels, and giving attachment to the obturator muscles; over these is the levator ani on each side, and thus a soft fleshy cushion is formed for the head to rest against in its passage through the pelvis. Posteriorly we have the pyriform muscle, part of the obturator, with the plexuses of nerves and bloodvessels, which pass through the two sacro-ischiatic foramina; and thus a similar fleshy cushion is formed for the head posteriorly.

In considering the various *measurements of the pelvis* at its different points of brim, cavity, and outlet, we may regard the pelvis as having certain *planes* at the several parts mentioned; and the measurements are usually taken at those planes in three different directions. Hence we have at the brim the straight, antero-posterior, or conjugate diameter, which is taken from the posterior aspect of the symphysis pubis to the most projecting point of the sacral promontory. Next we have the transverse, which is measured from the centre of the linea-ilio-pectinea of opposite sides; and lastly we have the two oblique diameters, which are taken from the two pectineal eminences to the opposite sacro-iliac synchondrosis. These oblique diameters are called respectively right and left, according to the sacro-iliac joints, the right oblique being measured from the right sacro-iliac joint, and the left oblique from the left joint.

The *Planes of the Pelvis* (Fig. 5) are represented by certain imaginary lines drawn from different parts of the pelvis. Of course these imaginary lines may be drawn at any conceivable part of the pelvis; practically, however, we limit these planes to three—viz., the plane of the brim, of the cavity, and of the outlet, and it is at these points that the several pelvic diameters are measured. The annexed sectional figure represents these several planes, and it will be seen that by their extension beyond the pubis they would all meet at a point about two inches from that bone. The line *a*, *b*, represents the axis of the pelvis from brim to outlet, and it intersects all the planes of the pelvis at a right angle. The axes of the brim, of the cavity, and of the outlet, are represented by lines drawn perpendicularly and at right angles to those several planes.

FIG. 5.



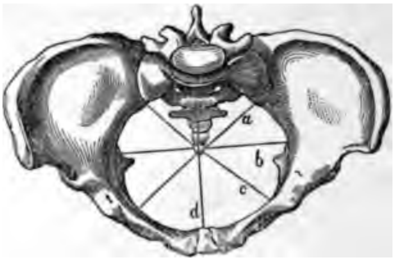
Thus measured, the *plane of the Brim* of the pelvis (*a*, *b*, *c*, *d*, Fig. 6), which is irregularly oval, presents the following dimensions:

Antero-posterior diameter	(*d*, Fig. 6),	. .	4¼ inches.
Transverse "	(*b*, Fig 6),	. ..	5¼ "
Oblique "	(*a*, *c*, Fig. 6),	. .	4¾ "

The *circumference* varies from 13 to 14½ inches.

In these and the following measurements it must be understood that the figures given refer to the dry condition of the pelvis, and would probably be diminished in the recent state by fully a quarter of an inch in the conjugate, and half an inch in the lateral.

FIG. 6.

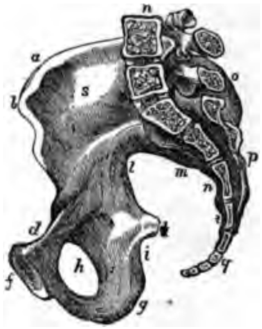


The plane of the *Cavity* presents some slight modification ; thus:

Antero-posterior diameter,	. . .	4⅔ inches.
Transverse "	. . .	4⅛ "
Oblique "	. . .	5⅕ "

The first of these measurements is taken from the centre of the hollow of the sacrum (*n*, Fig. 7), to the centre of the symphysis pubis (*f*); the second from the wall of the lower margin of the acetabulum on one side to that on the other; and the third from the obturator foramen (*h*) on the one side to the middle of the sacro-sciatic notch (*l*) on the other.

FIG. 7.

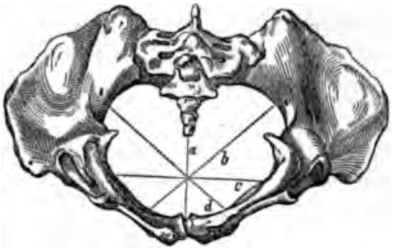


Furthermore, it must be noted that the perpendicular dimensions of the cavity are very peculiar, and should be borne in mind in reference to the progress made by the head in labor.

Posteriorly, from the promontory of the sacrum to the tip of the coccyx, it measures from 5½ to 6 inches, while anteriorly, behind the symphysis pubis, there is a depth of but 1½ or 2 inches; laterally from the tuber ischii to the brim it is about 3½ inches.

The *Outlet* (*a*, *b*, *c*, *d*, Fig. 8) presents much greater difference than exists between the brim and the cavity, for here the longest and shortest diameters have changed places with the brim,—the shortest diameter at the brim is the longest at the outlet, and the longest at the brim is the shortest at the outlet: thus:

FIG. 8.



Antero-posterior diameter	(*a*. Fig. 8), . .	4	inches.
Transverse "	(*c*, Fig. 8), . .	4¼	"
Oblique "	(*b*, *d*, Fig. 8), . .	4⅔	"

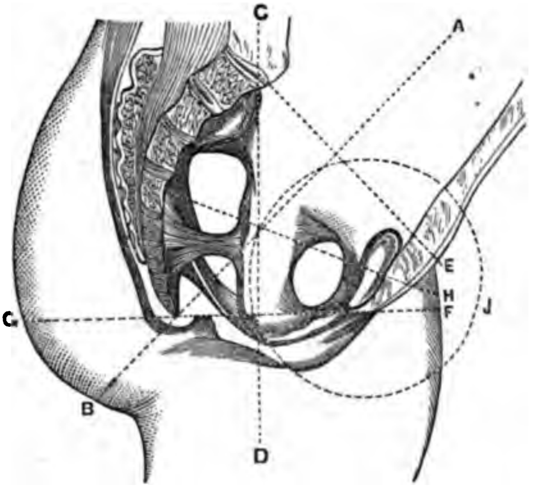
The antero-posterior, though here shown as only 4 inches, is capable of extension to another inch in consequence of the mobility of the coccyx. This measurement is taken from the coccyx to the lower border of the symphysis pubis; the transverse between the two tuber ischii; the oblique between the point of junction of the pubis with the ischium and the middle of the lower edge of the sacro-sciatic ligament.

It is worth while to bear in mind that as a general rule, all the oblique diameters, except that of the brim, are, in the natural state during life, the longest, and those of the brim are called right or left according to the sacro-iliac synchondrosis from which they are measured.

Now if we consider for a moment the shape and direction of the pelvis from brim to outlet, its several measurements and planes, we shall be able to understand how it is that the head of the child is, as it were, forced to take the direction which it usually does. For instance, suppose the head enters the pelvic brim in the transverse diameter, the occiput being directed to the left, and the sinciput to the right, as soon as it descends a little its two extremities are forced along the opposite planes of the ischium, the occiput taking usually the anterior plane of the left ischium, thus gliding towards the left foramen ovale, while the sinciput traverses the posterior plane of the other ischium towards the ischiatic foramen, or *vice versâ*, and thus a slight rotation is effected at this stage, which is still further increased when the occiput glides past the foramen ovale over the ischio-pubic ramus, and so under the pubic arch, while the sinciput passes gradually into the hollow of the sacrum over the lesser sacro-sciatic ligament. Thus the head comes to occupy in the cavity of the pelvis the antero-posterior or conjugate diameter.

Obliquity of the Pelvis.—The pelvis is so situated with regard to the rest of the trunk, that the *axis of the brim* (A, B, Fig. 9) forms with the horizon (F, G) an angle of about 55 degrees; the upper border of the pubis is thus considerably below the level of the promontory of the sacrum, nearly 4 inches according to Naegele. This is very well seen by reference to the dotted line (E) in the annexed figure, which indicates the plane of the pelvic brim. But in consequence of the difference already mentioned in the depth of the anterior and posterior walls of the cavity—

Fig. 9.



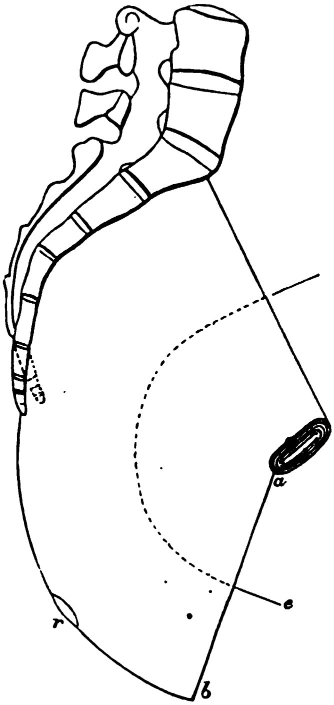
the one 1½ to 2 inches, and oblique in direction, the other about 5 inches long, likewise oblique and much curved—the axis is differently situated in different parts, and generally follows the curve of the pelvis. At the *inlet* it is directed downwards and backwards, coinciding with a line (A, B) drawn from a point a little above the umbilicus to the end of the coccyx. While at the *outlet* it is directed downwards and a little forwards, and follows a line from the promontory of the sacrum to the space between the tuberosities of the ischia (C, D). The line (H) in Fig. 9 indicates the plane of the cavity of the pelvis, and it is at this level that the dimensions of the pelvic cavity are taken.

It will thus be seen that the several axes of the pelvis vary a good deal in their direction, and they may be defined in all cases as lines drawn from the centre of and at right angles to their respective planes. Thus the axis of the pelvic brim is represented by a line drawn at a right angle from the centre of the plane of the pelvic brim. The axis of the cavity is represented by a line drawn at a right angle from the centre of the plane of the cavity; while the axis of the outlet is represented by a line drawn at a right angle from the centre of the plane of the outlet.

The circle (J) is called the circle or curve of Carus, and it was formerly supposed to indicate the complete axis of the entire pelvic canal, and to represent the course which the child takes in its passage through the pelvis; its centre is in the middle of the symphysis pubis, and its radius is the half of the pelvic diameter at this point. The same was said of the two other diameters—inlet and outlet—so that the circle was thought to intercept the centre of all the diameters of the pelvis, and in this way to correspond with the course followed by the fœtus in its passage through the pelvis. This, however, is now known to be an error, for the pelvic canal is not a simple cylinder, and no such circle or curve can represent its axes at different points from brim to outlet.

The true pelvic curve or *Axis of the Parturient Canal* is represented in the annexed diagram, Fig. 10. Here the planes of the brim and outlet are extended to their point of intersection at *a*, from which point lines may be drawn through the pelvic cavity representing so many imaginary planes, and if now we "draw a line which shall pass through the geometrical centre of each of these planes, that line will be found to be a curve, which coincides very closely with the axis of the true pelvis, which is the segment of no circle, and which has been well described as an irregular parabola."—*Leishman.*

FIG. 10.



External Measurements.—The dimensions of the pelvis, derived from *external* measurements, are occasionally of some moment in the diagnosis of deformities; and though too much reliance should not be placed upon them, yet the following results, which are given from a large number of observations, possess some value:

The external antero-posterior diameter of the pelvis is from 7 to 8 inches.

The external transverse, between the crista of the ilia of either side, 13 to 16 inches.

From the anterior superior spine of the ilium of one side to that of the other, 10 to 12 inches.

From the great trochanter of one side to the sacro-iliac synchondrosis of the other, 9 inches.

The depth of the pelvis, from the top of the sacrum to the coccyx, from 4 to 5 inches.

It is said that by deducting about three inches from the antero-posterior diameter, and four inches from the transverse, some approximation to the diameters of the pelvis internally will be made.

It remains now only to notice the chief *differences in the male and female pelvis.* In the female the bones are thinner, smoother, and more delicately formed; the alæ ilii are more widely spread, the brim is more capacious, the promontory of the sacrum less projecting, the cavity shallower and broader, the sacrum more curved, the symphysis pubis shorter, the arch of the pubis wider and more rounded, the tuberosities ischii farther apart, the acetabula are also wider, thus throwing the thigh bones more apart, and the foramen ovale is triangular instead of being round. Speaking generally, we may say that the male pelvis is chiefly remarkable for its depth and narrowness, the female for its width and shallowness; a difference of considerable importance, inasmuch as it exposes less surface to the pressure of the child's head, resistance is consequently diminished, and this is favored by the generally increased capacity.

For an account of the various *abnormalities of the pelvis* the reader is referred to the chapter which treats of the subject of Unnatural Labor from an Abnormal Condition of the Passages.

CHAPTER II.

FEMALE ORGANS OF GENERATION.

THE female organs of generation or reproduction may be conveniently considered under two heads, *internal* and *external.*

The *External Organs of Generation* include all those parts situated in front of or external to the hymen, and together constitute what is called the *vulva*, or *pudendum.* They are the *mons Veneris, labia, clitoris, nymphæ, vestibule, hymen,* and *carunculæ myrtiformes.* The *meatus urinarius* and *perineum* also deserve mention, though not strictly parts concerned in generation.

The *Mons Veneris* is that portion of the integument overlying the symphysis pubis, and containing beneath it a variable quantity of adipose and fibrous tissue, which gives rise to the prominence, whence its name; it is generally covered with hair after the age of puberty, and contains many sebaceous follicles.

The *Labia majora* (*a*, Fig. 11) are two rounded folds of integument, extending, one on either side, from the mons downwards and backwards, to within about an inch from the margin of the anus, where they join; the points of union both in front and behind are called *commissures.* Just within the posterior commissure is a small transverse fold connecting the two labia, and called the *fourchette;* it is usually destroyed in the first labor. Between it and the commissure is a small space called the *fossa navicularis,* and between the labia is the *rima*, or fissure leading to the vagina. The labia themselves are covered with skin on the outer side, and on the inner the mucous membrane of the vagina begins. They contain in their folds fat, bloodvessels, nerves, and glands, together with some structure resembling the dartos in the male scrotum.

The *Clitoris* is a small elongated body, situated in the upper part of the vulvar fissure, just beneath the anterior commissure. It resembles the penis in the male, and, like it, consists of two *corpora cavernosa* attached by *crura* to the rami of the ischium and pubis; but it is unlike that organ in not being perforated by the urethra. It contains a small imperforate *glans*, composed of erectile tissue, covered by mucous membrane of extreme sensibility, the lower border of which forms a prepuce. There is a small *suspensory ligament* attaching it to the pubis, and two little muscles of striped fibre, the *erectores clitoridis*, inserted into the crura of the corpora cavernosa. It is abundantly supplied both with nerves and bloodvessels, and is the most sensitive of all the external generative organs.

The *Nymphæ*, *labia minora* or *interna* (*b*, Fig. 11), arise by a double origin from the clitoris and its prepuce, one on either side; they are about an inch and a half in length, and somewhat resemble a cock's comb. They descend obliquely downwards as distinct folds of mucous membrane, becoming continuous with that of the vagina on the one hand, and the external labia on the other. They contain a good many bloodvessels, but are not erectile, and correspond with the tegumentary covering of the male urethra, which here remains ununited along the middle line.

The *Vestibule* is a small triangular space of about an inch in length, covered with mucous membrane, and containing at its apex the clitoris; at the base, which is formed by the roof of the vaginal orifice, is situate the *meatus urinarius*, a slight prominence covered with mucous membrane; on either side are the nymphæ already described.

The *Hymen* is a double layer of mucous membrane, situate at the entrance of the vagina, which it guards; it is of crescentic form, the concave margin looking towards the pubis; it contains a small quantity of fibrous tissue and bloodvessels; sometimes it is circular, having a central orifice; at other times cribriform; at others imperforate. When ruptured it forms three or four little rounded or triangular appendages, the *carunculæ myrtiformes:* by some these are considered as accidental formations, having nothing necessarily to do with the hymen.—*Farre.*

The *Meatus Urinarius*, situated, as above described, about an inch below and behind the clitoris, beneath the symphysis pubis, between the nymphæ, and above the orifice of the vagina, leads by a short tube of about one inch and a half upwards and backwards, behind and beneath the pubis into the bladder.

The *Perineum* lies between the lower or posterior border or union of the labia and the margin of the anus, a space of about an inch in extent. It is capable of great distension, even to as much as four or five inches, during labor.

Before dismissing the subject of the external generative organs, it will be well to notice the *secretory apparatus* which exists in these parts. M. Huguier divided it into two classes:

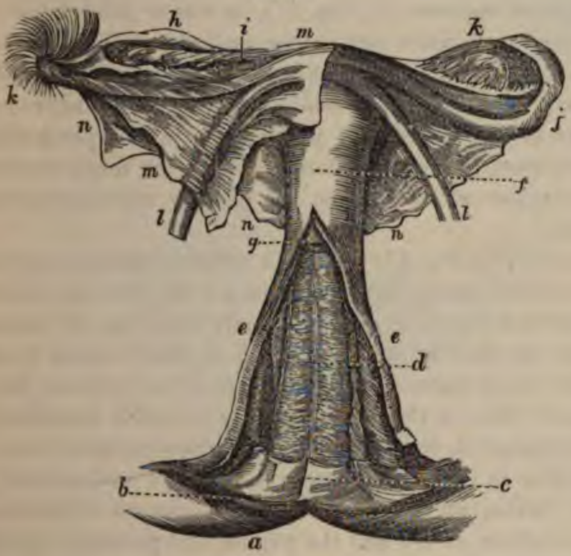
1st. *Sebaceous follicles*, which are extremely numerous about the vulva.

2d. *Muciparous organs*, of which there are two varieties,—first, those clustered together or scattered singly about the orifice of the vagina; they vary in number in different parts; second, the *vulvo-vaginal glands*, or glands of Bartholini, two conglomerate glands resembling the lachrymal, and situate one on either side of the posterior part of the vagina. Each opens on the surface by a single orifice at the anterior border of the hymen, and is there distinguishable as a little red point. They are only fully developed at puberty, and are in full activity during either sexual indulgence or labor, when the parts are freely lubricated by the secretion, which is abundantly poured out by a sort of muscular action, " like the extrusion of sperm fluid in the male."—*Cazeaux.*

The *Internal Organs of Generation* include all those situated beyond the hymen—namely, the *vagina, uterus, ovaries, Fallopian tubes*, and the *broad* and *round ligaments.*

The *Vagina* is that portion of the generative tract which leads from the vulva to the uterus; in shape it resembles a flattened tube, slightly curved, with the concavity forwards, its axis being at the upper part parallel with the cavity, at the lower with the outlet of the pelvis. In the annexed drawing (Fig. 11), *c* represents the commencement of the vagina, which extends up as far as the os uteri at *g*. The posterior raphé is indicated at *d*, the vaginal walls being throughout rugose; *e, e*, represent the section of the anterior wall of the vagina. The vagina measures in the virgin state about 2½ inches along the anterior, and 3½ inches on the posterior wall, transversely about 1½ inches. Its walls are mostly in apposition, forming a pillar rather than a tube, on which the uterus is, to some extent, supported. It has the bladder and urethra in front; the perineum, rectum, and recto-vaginal pouch of peritoneum behind; laterally the broad ligaments and pelvic fascia. With all these it is connected by loose cellular tissue, but the amount of cellular tissue varies a good deal in different parts; thus behind, the quantity is very small, and it should be borne in mind that here, between the cervix uteri and rectum, the vagina is in close contact with the peritoneum; it is the only part where this relation exists. In front, between the vagina and bladder, the quantity of cellular tissue is considerable, and on either side there are the broad ligaments, in which is a large amount of cellular tissue, so that in these three places pelvic cellulitis is most apt to occur, and may accordingly be thus diagnosed.

FIG. 11.

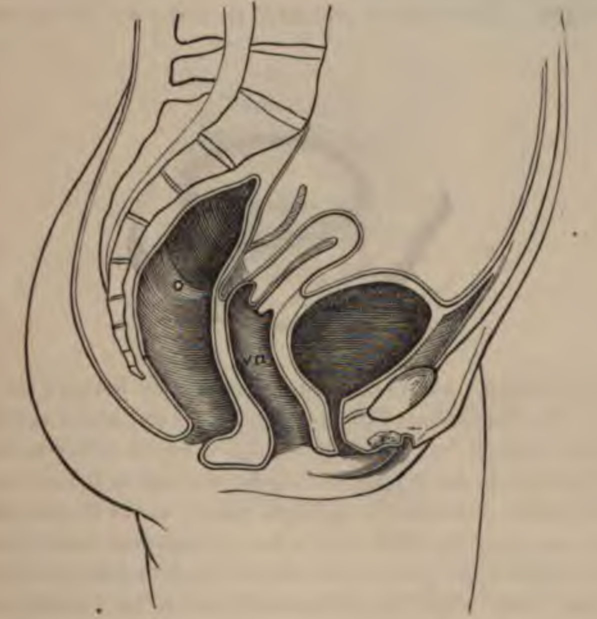


The roof of the vagina surrounds the cervix uteri, forming as it were a kind of cup into which the uterus fits. The posterior cul-de-sac is deeper than the anterior, more of the vagina being there reflected over the cervix, and here the vagina is in immediate contact with the peritoneum; it is the only place where this obtains. In structure the vagina may be said to have three coats: outside, a fibrous coat, with abundance of elastic fibre; next, a muscular coat, with unstriped fibre, which becomes largely developed during pregnancy; lastly, a mucous coat of connective tissue, with elastic fibre, covered with squamous epithelium, and imbedded with numerous muciparous follicles. These glands pour out an abundant secretion during sexual or other local excitement, as also during pregnancy and in the early part of labor, at which time it is always regarded as a favorable sign, as it softens and lubricates the parts. On the other hand, the suppression of this secretion, attended, as it generally is, with a great increase of local heat and redness, is always of unfavorable import, as it indicates exhaustion. Along its inner surface, on the anterior and posterior wall, are two ridges in the median line, *the columnæ rugarum* (*d*, Fig. 11), on either side of which are transverse rugæ, which seem to be continuous with similar rugæ in the cervix uteri. The orifice of the vagina is guarded by a sphincter muscle. Bloodvessels are very plentiful, especially near the orifice, the veins of which are collected, particularly at its upper part, to form the *plexus retiformis* or *corpus cavernosum* of the vagina—so called from the cellular appearance which it presents.

The *uterus* (*f*, Fig. 11) is a continuation of the generative tract, and though of prime importance in all the processes connected with parturition, it is, physiologically speaking, of secondary value in comparison with the ovaries, to which indeed it may be regarded as an appendage, seeing that all its functions are subservient to those of the ovaries, both in regard to unimpregnated and impregnated ovulation. In the unimpregnated state it is situate deep in the pelvis between the bladder and rectum (Figs. 11, 12), having an ovary and Fallopian tube on either side, the small intestines above, and the vagina and perineum below; by these, together with its proper ligaments, it is kept in position, subject to the variations which the mobility of the neighboring viscera, under changing circumstances, allows. Ordinarily it does not project above the pelvic brim, but is so placed that its long axis corresponds pretty much with the axis of the pelvic brim or inlet, at least that is my opinion, though many authorities believe that in the virgin or nulliparous woman, the uterus is normally antecurved. My own observations, however, made with all due care, lead—as I have elsewhere stated in an article on "Uterine Displacements," in *The Lancet* for 1866—to the conclusion that ordinarily there is little or no curvature in the general direction of the uterine canal; that on the contrary, it is straight throughout its course, and that its direction is continuous with, and parallel to, that of the cervix. My belief is, further, that the normal axis of the uterine cavity is identical with that of the pelvic brim, or inlet, being represented by a line drawn from the umbilicus downwards and backwards to the coccyx, and forming with the horizon an angle of about 30 degrees (see Fig.

9, page 36). Whenever it is found that the direction of the uterine cavity differs permanently from this, there, in my opinion, is evidence of something abnormal.

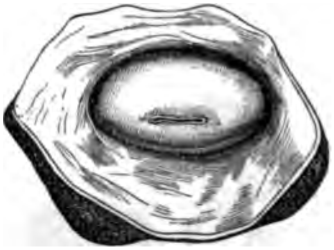
FIG. 12.



The relation of the several pelvic viscera is very well represented in the foregoing illustration, Fig. 12. Here it will be seen that the uterus, which, together, with the other viscera, is shown in vertical section, is nearly or quite straight in its internal longitudinal aspect, and that its long axis occupies in the main the axis of the pelvic brim.

The uterus is covered by peritoneum over its posterior surface, fundus, and about two-thirds of its anterior surface; laterally the peritoneum is reflected so as to form, together with the blood-vessels, nerves, and some cellular tissue, the broad ligaments, which will be noticed presently. The *weight* of the organ varies from 9 to 12 drachms in the virgin state. The general *form* of the uterus is more or less pear-shaped, but flattened from before backwards; the cervix is ovoid in shape (Fig. 13), with its long diameter in the transverse of the pelvis, and the os has an elliptical form, which in the virgin or nulliparous state is quite smooth and even, without any puckerings, abrasions, or nodulations. It is divided into three parts, not, however, by any very distinct anatomical boundaries. The upper part is called the *fundus*, the lower portion the *cervix*, and that between these two the *body* of the organ. The cervix is separated from the rest by several distinctive features, but no marked division exists between the other two. The *dimensions* of the unimpregnated uterus are as follows: Extreme length from 2⅓ to 2¾ inches, of which rather more than half belongs to the fundus and body, the rest to the cervix; the width varies somewhat in different parts: at the fundus, near to the entrance of the Fallopian tubes, it measures about 1⅓ of an inch; at the upper part of the cervix 1 inch, and at its lower part 1⅛ of an inch; while its thickness from before backwards is about 1 inch; half an inch, that is, to each wall. These several points are all very well represented in the subjoined illustration, Fig. 14.

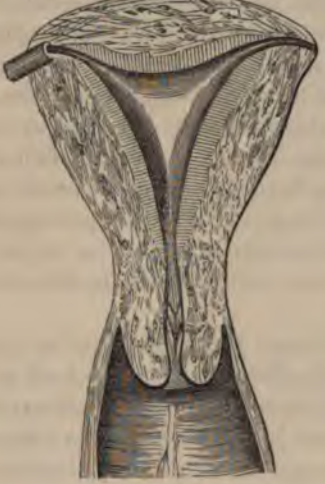
FIG. 13.



The *fundus* is the convex triangular portion situate between the two Fallopian tubes, and forming the roof of the uterus; to it the placenta is most frequently attached. The *body* extends from the fundus to the cervix; at the junction of the fundus with the body on either side is a receding angle, in which is seen the orifice of the Fallopian tube. The *cervix* or neck is the lowest portion of the uterus; it is a little over 1 inch in length, and slightly projects into the vagina, from which it receives an investment. On its most depending portion is a transverse aperture, the *os uteri* or *os tincæ*, the lips of which are formed by the termination of the anterior and posterior uterine walls, the latter being somewhat the larger.

The *cavity* of the organ, as seen in the illustration, p. 47, is triangular in shape, with the base at the fundus; its length in the virgin state is about 2¼ inches, breadth between the Fallopian tubes 1⅓ inches, in the centre half an inch barely, and at the lower orifice ⅙ to ⅓ of an inch. At each of the three angles there is an opening; the two upper are the orifices of the Fallopian

FIG. 14.



tubes, the lowermost, which is also the narrowest part of the uterine cavity, is the *os uteri internum*, leading into the canal of the cervix, which is about 1 inch long and from ⅓ to ⅔ of an inch across its widest part, which is at the middle.

The *mucous membrane of the cervix*, continuous with that of the vagina, is arranged in folds or plicæ, which, however, are so diversified that "if twenty specimens be compared together, scarcely two will be found to present quite the same arrangement" (Farre); generally there is a prominent raphé in the centre of each wall, and from either side of this, horizontal folds, six to nine in number, are given off, which soon bifurcate, and give rise to what is called the *arbor vitæ uterinus*. In the virgin or nulliparous state these folds and the median raphé are much less marked than in the uterus that has borne children; the convex appearance of the internal aspect of the uterine walls is also more marked in the nulliparous uterus than in that which has been gravid. While, however, these signs may be stated as generally tending to support the opinion that a given uterus is of the nulliparous class, it must be admitted that there are no positive tests by which this question of previous gravidity can be determined, and where any important issue is involved no certain opinion can or ought to be given regarding it. In the mucous membrane numerous follicles and glands are to be found, besides some small vesicular bodies, erroneously styled the *ovulæ Nabothii;* they are nothing more than obstructed mucous follicles. The cervical mucous membrane is covered with scaly epithelium, like that which covers the mucous membrane of the vagina.

The *structure of the uterus* consists of bundles of plain unstriped muscular fibre; these permeate the mucous coat of the viscus, and are clearly seen among the mucous follicles, after emerging from which "they begin to exhibit a certain order of stratification, the strata being very closely superimposed, and arranged, for the most part, in such a manner as to lie parallel with the walls of the uterine cavity, which is, therefore, surrounded by them."—*Farre.*

Some have disputed the muscularity of the unimpregnated uterus; but, besides the fact, upon which all are agreed, that the uterus is entirely muscular during gestation, and that no muscular fibres could then be developed from a tissue which previously had no such elements in it, there is abundant evidence of its muscularity during certain morbid states, as in the growth ot tumors within its cavity.

The muscular fibres seem to be arranged in two distinct ways, transverse or circular,' and longitudinal: the circular are met with in greater abundance at the fundus, and may be distinctly seen round the entrance of each Fallopian tube; the longitudinal are mostly found about the cervix. "The prevalence of the longitudinal fibres," says Sir C. Bell (in a paper on the "Muscularity of the Uterus," in vol. iv of the *Med.-Chir. Trans.*), "is undoubtedly a provision for diminishing the length of the organ or for drawing the fundus towards the orifice. At the same time these longitudinal fibres must dilate the orifice and draw the lower part of the uterus over the head of the child." The average breadth of one of the uterine fibres at the widest part is $\frac{1}{4000}$ of an inch; their length is uncertain, but they are mostly fusiform and nucleated.

The *lining membrane* of the uterus is usually of a bright-red color, and though a true mucous membrane, it has no submucous tissue. It appears to be made up of a countless number of small tubes, the *utricular glands or follicles*, arranged perpendicularly to the surface. They are very tortuous, and end by blind extremities in the mucous tissue; their diameter varies from $\frac{1}{250}$ to $\frac{1}{500}$ of an inch; their length cannot be estimated, as from their tortuosity no single tube can be seen throughout its course; they are lined with a delicate ciliated columnar epithelium. The lining mucous membrane of the uterus is continuous both with that which lines the Fallopian tubes and that which lines the vagina; in pregnancy it becomes enormously hypertrophied, and forms what is called *the decidua*.

The *arrangement of the capillaries* is peculiar; they usually pass between the canals of the uterine glands or follicles, giving to them a few small branches in their course. Having reached the surface of the mucous membrane they spread out into a meshwork of round, oval, or hexagonal spaces, in the centre of each of which may be usually observed the orifice of a uterine gland.—*Farre.*

The *bloodvessels of the uterus* are derived from three distinct sources: the two ovarian, and the two uterine arteries, from the internal iliac, and a small twig which goes off from the epigastric artery, giving branches to the round ligament which it supplies, and finally inosculating with the terminal branches of the uterine and ovarian arteries about the fundus uteri. All these bloodvessels are remarkable for their free inosculation and tortuosity, and it will be observed that these three sources of blood supply meet at the fundus, so that this part is much more carefully supplied with blood: moreover very special provision is made for the due return of blood from this part of the uterus, so as to avoid as much as possible any tendency to stagnation and congestion. This point is obviously of great importance in regard to the mechanical views of uterine pathology which are held so strongly by some authorities, and seems directly to refute the idea that this part of the uterus can ever undergo a process of strangulation, as has been affirmed by one very distinguished authority. The *lymphatics* are very abundant; they form a superficial and a deep set. The *nerves* are derived mostly from the aortic and hypogastric plexuses of the sympathetic system; but there are some also from the spinal, the hypogastric branches; the former are chiefly gelatinous, the latter tubular.

The *ligaments* of the uterus are four pairs: two *anterior*, or utero-vesical, and two *posterior*, or utero-sacral, formed by reflec-

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tions of the peritoneum from the uterus on to the bladder and rectum respectively; laterally are situate the *broad ligaments*, formed by the peritoneum as it passes from the front (*m*, Fig. 11) and back (*n*, Fig. 11) of the uterus to the sides of the pelvis, and inclosing within the folds the Fallopian tubes, part of the round ligaments, the ovaries and their ligaments, together with blood-vessels, nerves, and lymphatics, all of which are surrounded with cellular tissue, which is specially involved in cases of pelvic cellulitis. The *round* or *subpubic ligaments* (*l*, Fig. 11) are bundles of fibres proceeding from the uterus at its upper angles to the inguinal canal, thence to the symphysis pubis, where they become attached.

The changes which take place in the uterus after impregnation and during gestation, will be noticed in the next chapter.

The next structures met with, proceeding onwards in the generative tract, are the *Fallopian tubes*, or ovarian ducts (*j*, Fig. 11): they are more or less trumpet-shaped, the free extremity being the larger; each is from three to four inches long. Arising at the upper angle of the uterus, narrow and cord-like, they proceed outwards, gradually enlarging, and becoming slightly tortuous, and end in the mouth, or expanded extremity, which is directed downwards and backwards towards the ovary. At this point the orifice of the tube is split up into numerous processes, or *fimbriæ* (*k*, Fig. 11), one of which is attached to the outer end of the corresponding ovary (Quain). The orifice at this, the *fimbriated extremity* of the Fallopian tube, is called the *ostium abdominale*, and is that which receives the ovum as it escapes from the ovarium; while that which joins the uterine cavity is called the *ostium uterinum*, and is so small as scarcely to admit a bristle.

The Fallopian tubes are composed of unstriped muscular fibres, arranged in two layers, an external longitudinal and an internal circular; they are invested with peritoneum over their free surfaces, and are lined by a mucous membrane which is continuous with that of the uterine cavity. At their fimbriated extremity they open into the peritoneal cavity, and it is the only instance in which a serous cavity opens on a mucous or any other surface. The mucous membrane of the Fallopian tubes is arranged in folds, or plicæ, and is covered with ciliated epithelium, but it does not contain any glands.

The Fallopian tubes are supplied with blood from the ovarian arteries, together with a branch from the uterine artery, which anastomoses with the former, and with nerves from the hypogastric and aortic plexuses. The lymphatics join the other trunks from the generative organs.

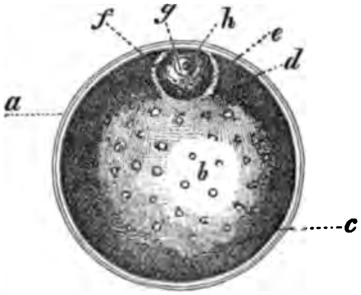
The functions of these organs will be considered in the next chapter.

The *Ovaries* (*h*, Fig. 11) are two oval biconvex bodies situated on a level with, and on either side of, the uterus, from which they are separate about an inch or an inch and a half, but are maintained in connection with it through the *ligamentum ovarii* (*i*, Fig. 11). They are about an inch and a half long, three-quarters of an inch wide, and half an inch thick, having an average weight of about 4½ scruples. Situated on the posterior aspect of the broad ligament, each is invested with a fold of peritoneum derived from it, and besides this attachment, they are secured still further to the uterus by their proper ligaments. Some authorities affirm that these organs receive no covering from the peritoneum, but the weight of evidence is, I think, wholly in favor of the former view, and this is supported by reference to their developmental history. Their surfaces are usually very smooth in their virgin state, but from changes which subsequently take place in them, and which will be presently noticed, they become uneven, shrivelled, and corrugated. These bodies derive their nourishment partly from the spermatic (ovarian) arteries, and partly from the uterine arteries, both of which reach them between the layers of the broad ligament. They enter the ovaries with the nerves at their lower border, and immediately spread out into an exceedingly fine plexus of convoluted capillaries, running more or less in parallel lines, and ramifying into every part of the fibrous stroma.

The nerves of the ovaries are derived from the renal and aortic plexuses (Snow Beck).

Besides the peritoneal covering already mentioned, which is everywhere firmly adherent, except where it starts from the broad ligament, the ovaries are completely incased in their own proper tunic, the *tunica albuginea*, a dense and firm structure, separable only with great difficulty from the ovary itself. The *parenchyma*, or *stroma*, of the ovary, which serves the purpose merely of supporting the ovisacs imbedded in it, is of a pale reddish color, and under the microscope is seen to consist mainly of bloodvessels held together by white fibrous tissue, with numerous fusiform embryonic fibres, and elliptical and round cells of granules (Farre). On making a section of an ovary numerous small vesicles will be seen, the *Graafian vesicles or follicles;* they are spherical or ovoid in shape, and their number varies from thirty to two hundred in each ovary; "in very young subjects their numbers exceed all power of accurate computation." Examined more minutely, each vesicle, with its contained ovum, is found, according to the observations of Dr. Arthur Farre, to consist of the following parts: In the first place, there are three coats, or membranes, an *external vascular tunic* (*a*, Fig. 15), which appears originally to be quite independent of the true ovisac on which it rests, and which it serves to protect and nourish; it is derived from the stroma of the ovary, contains abundance of bloodvessels, which pass in to supply the second tunic, some few fibres and nuclei, but no oil. The second or *internal coat* is the proper ovisac, and with the former constitutes the *true Graafian follicle* (Fig. 15). It is composed of embryonic fibres of connective tissue, nucleated cells, or granules, and abundance of minute oil-globules. Within this there is a third membrane, which consists merely of a sort of epithelial layer of nucleated cells, called the *membrana granulosa* (*c*). Within this, again, other nucleated cells, or granules, aggregate upon and around the ovum, forming the *tunica granulosa* of Barry. Lastly, there is a central mass, in which the ovum, with its *tunica granulosa*, is imbedded, and from which two or four flattened bands pass outwards to the *membrana granulosa;* these are the *retinacula* of Barry. An albuminous fluid, granules, and oil-globules, make up the rest of the contents of the follicle of Graaf (*b*).

FIG. 15.



Structure of an Ovum.—It will be convenient now to consider the component parts of an individual ovum, and the several changes through which it passes from its original formation to its escape from the ovarium; together with the alterations which take place in the ruptured follicle, according as impregnation has or has not ensued.

It may be premised that ova are mostly developed in the peripheral portion of the ovary. They are remarkably uniform in size, being about $\frac{1}{120}$ of an inch in diameter. When an ovum is in process of formation, the first change noticed in the ovary is the aggregation of a considerable number of the primary cells from the stroma into little round or ovoidal masses. Soon a delicate transparent membrane is detected encircling the mass, which afterwards becomes the ovisac, and within the mass is already seen the *germinal vesicle* (*g*, Fig. 15), a smaller body about $\frac{1}{720}$ of an inch in diameter. Whether this is developed from the ovisac, or has its existence before the ovisac is formed, is at present undecided.

Within the germinal vesicle is to be seen the *germinal spot* (*h*), a collection of cells and granules measuring about $\frac{1}{2500}$ to $\frac{1}{8500}$ of an inch in diameter, while outside the vesicle is the *vitellus*, or *yolk* (*f*), which is completely encircled by the clear ring of the *zona pellucida* (*e*). The dark outer ring, which is seen with especial prominence in the neighborhood of the ovum, is called the *discus proligerus* (*d*).

The next change noted is the formation of an epithelial layer within the membrane above mentioned. It should be borne in mind that at present the ovum is perfectly loose in a little cavity formed in the substance of the ovary; now, however, another coat is formed from the surrounding tissues of the ovary itself, which shortly unites with the ovisac, forming, as we have seen, its external or vascular tunic, the two together constituting the Graafian follicle. At this point, then, we have the ovum surrounded by fluid inclosed in a delicate epithelial membrane; this is further inclosed in the ovisac, and this again in the vascular tunic. Gradually, now, the follicle, or follicles—for several may be in process of formation at the same time—approach nearer to the surface of the ovary, and may be seen projecting from it; a little fluid and blood is effused, so that slight fluctuation may be detected; the proper coat of the ovary thins, and permits sometimes the sanguineous contents to be seen through the peritoneal coat. If, now, the follicle be laid open, we shall find that the inner coat or ovisac is of a bright-yellow color—the *corpus luteum*—and from having grown more rapidly than the outer tunic is already thrown into slight folds. It also contains numerous minute oil-globule which are probably the cause of the yellow color, with bloodvessels and fibres of connective tissue. Sometimes the vessels are s numerous that the yellow color is obscured.

Having at length reached the surface of the ovary, minute vessels are seen ramifying over this spot, and the containing membranes, four in number—ovisac, capsule, tunica albuginea, and peritoneum—which have all become united as one, after awhile rupture from distension by the fluid contents, and the ovum escapes with portions of the membrana granulosa into the mouth of the Fallopian tube, which has meanwhile been applied to this part of the ovary.

The further changes which take place in the Graafian follicle are by no means so uniform as those above described, but present certain variations according as impregnation has or has not taken place. In the latter case, the first thing which ensues is a contraction in the tunica albuginea of the ruptured follicle and a simultaneous diminution of the prominence over this part of the ovary. This occasions a puckering of the internal coat, which as regards color and arrangement produces an exact miniature resemblance to the surface of the brain when sliced. Should the clot which was effused before the rupture took place remain in the cavity, it gradually gets smaller and becomes a centre whence the rays of the convolution start. If there be no clot, then the cavity is gradually obliterated, and by degrees a depression is formed on the surface of the ovary where once the prominence existed. The yellow color is soon lost, the external envelope of the follicle likewise disappears by again becoming blended with the stroma of the ovary, and a white zigzag line is seen in the place of the inner membrane, which has become shrunken and convoluted; ultimately all trace of the follicle is lost.

But supposing that impregnation occurs, the changes, though with the same ultimate tendency, are produced much more slowly, "conducted upon a larger scale and with a greater abundance of materials," in consequence of the much larger supply of blood which is at once sent to the generative organs generally and to the uterus in particular, the vessels of which inosculate very freely with those of the ovaries. Hence, though the outer covering undergoes no particular change, the original ovisac increases so as gradually to obliterate the cavity and becomes more yellow from the addition of oily matter; being confined within narrow limits, it assumes more and more a puckered appearance. At the fourth month of gestation, the ovary whence the impregnated ovule escaped, is seen to be larger and more swollen than that on the opposite side, the follicle has assumed its maximum development, and occupies about one-fourth part of the ovary. On section the outer coat is still seen to have undergone no change ; the second coat is greatly augmented in thickness and in the yellow material with which it is filled, but retains the same relative position it had from the first: internal to this is a white layer, clearly of new formation, which Dr. Farre believes arises from the metamorphosis of the blood-clot already described as occupying the centre of the follicle before the ovum had escaped. From this time retrogressive changes take place, the follicle diminishes, the walls approximate, the white lining gets thinner, and its plications intermingle with those of the so-called corpus luteum. At the time of delivery little else is seen than a white delicate cicatrix in the midst of the yellow coat, and in a few months all traces have disappeared.

The several changes here described are very well represented in the annexed illustrations, taken from Prof. Dalton's work on *Human Physiology*, who thus describes briefly the difference between the corpus luteum of simple menstruation and that which occurs after impregnation takes place: "We find, then, that the corpus luteum of menstruation (Figs. 16, 17, 18), differs from that of pregnancy (Figs. 19, 20, 21) in the extent of its development and the duration of its existence. While the former passes through all the important phases of its growth, and decline in

FIG. 16.

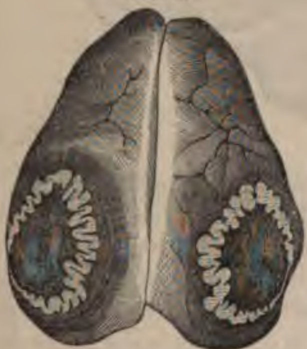
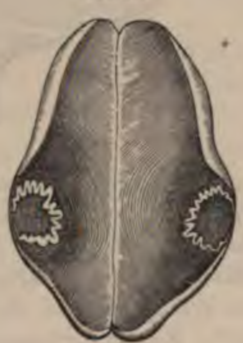
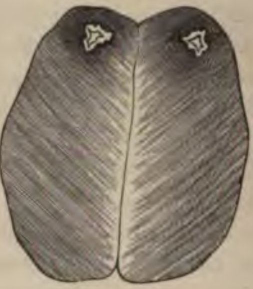


FIG. 17.



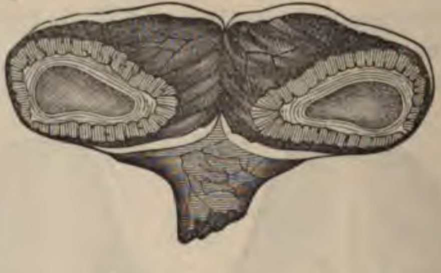
the period of 2 months, the latter lasts from 9 to 10 months, and presents during a good portion of the time a larger size and a more solid organization."

FIG. 18.



These characteristic differences are all very well seen in the drawings taken from Dalton. Fig. 16 shows the Graafian follicle three weeks after the rupture of the ovisac and the escape of the ovum, and between this and Fig. 19, which represents the corpus luteum after impregnation, at the same date, there is not much difference; Fig. 17 shows the follicle at the end of a month, and now the difference between it and Fig. 20, which represents the same date after impregnation, is very marked, for while the former has greatly declined, the latter, on the contrary, has greatly increased. So also corresponding difference is observable in Figs. 18, 21, which represent the follicle, in the former case two months after menstruation; in the latter, at the same period after impregnation. At the end of six months after menstruation all trace of the follicles has disappeared, while in the case of impregnation,

FIG. 19.



at the same period the follicle, or rather corpus luteum, is still about the same as at the second month.

FIG. 20.

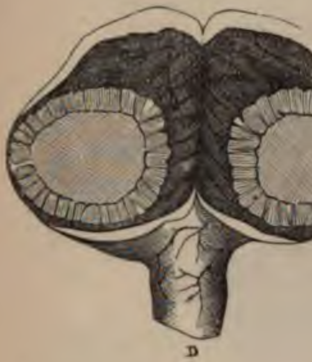
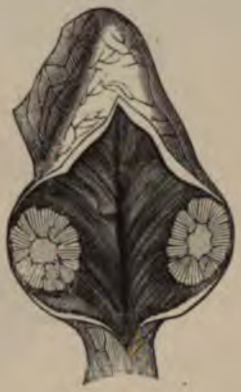


FIG. 21.



For much which has been stated in the above description of the changes which take place during ovulation, I am indebted to the very admirable and elaborate article by Dr. Arthur Farre on the "Uterus and its Appendages," in the *Cyclopædia of Anatomy and Physiology*, which, with his own researches, and a critical digest of the labors of Martin Barry, Thompson, Valentin, Wagner, Puckridge, and others, forms one of the best monographs on the subject in the English language, and also to the work of Professor Dalton on *Human Physiology*.

The description of the external organs of generation would hardly be complete without some account of those glands which play such an important part in utero-gestation, not only as regards the nutrition of the infant after birth, but also for the valuable indications they often afford of the existence of pregnancy. I refer to the two mammary glands, some account of the anatomy of which may here be fitly introduced. Their value as indicators of the existence of pregnancy will be considered in the chapter on the Signs and Symptoms of Pregnancy.

Each gland, besides containing a good deal of fat, is composed chiefly of a great number of lobes, which are again subdivided into numerous lobules. One such lobe is represented at *a*, Fig. 22, and from each lobe a distinct and separate excretory duct emerges. Tracing one of these lobes, we find that it divides and subdivides again and again, until it finally ends in minute lobules (3, Fig. 23). It is here that the milk is secreted by the glandular secreting epithelial cells which line these lobules, as is represented in the annexed illustration (Fig. 24), taken from Henle. In between these lobules are bands of connective tissue, which bind them all together (1, Fig. 23), and from each globule there issues a minute tubule (2, Fig. 23). These again unite and reunite to form ultimately the milk-ducts, which as they converge towards the nipple, finally end in about 15 or 20 tubes, which dilate in the areola so as to form sinuses or reservoirs where the milk is retained until it is sucked or drawn out by the infant. We see, then, that the breast is one large conglomerate gland of innumerable smaller glands, very much, in fact, as regards its type of structure, like the liver or the salivary glands.

FIG. 22.

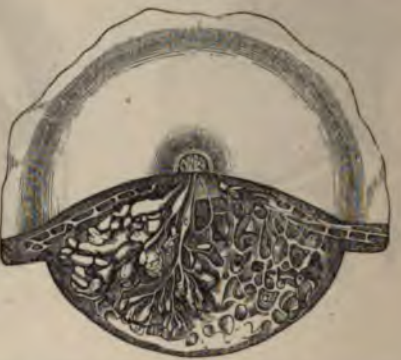


FIG. 23.

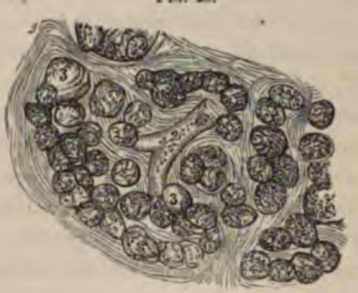
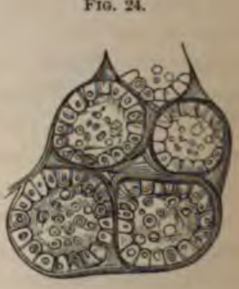


FIG. 24.



CHAPTER III.

CONCEPTION AND GESTATION.

It will be convenient in considering this part of the reproductive function to arrange the phenomena under two heads—

First, *those connected with the development of the ovum.*

Secondly, *those connected with the development of the uterus.*

DEVELOPMENT OF THE OVUM.

Hitherto we have only considered the changes which take place in the ovum up to the time of its escape from the ruptured Graafian follicle. Before, however, this has been completely accomplished, by some strange and hitherto unexplained proceeding, the fimbriated or trumpet-shaped extremity of the Fallopian tube, which in the human subject is unable to encompass the entire ovary, has seized upon that particular portion of it whence the matured ovum is about to escape, and patiently but firmly awaits the rupture, that it may conduct to the uterus, either for future developement or for extrusion, the ovum which has been emitted. We know nothing for certain of the force which impels the Fallopian tube to make this movement, nor how one particular ovary and one spot only of that is selected. Some elaborate researches made by M. Rouget have demonstrated the existence of muscular fibres in the broad ligament, the action of which, he affirmed, would approximate the tube to the ovary, and this would be further maintained by some errectile tissue present in the region of the ovary itself. There can be no doubt, I think, that this movement of the Fallopian tube is the direct result of vascular excitement, and that in fact erection of the parts is the consequence of injection, just as happens in the case of the male organ, and being erect, the fimbriated extremity of the tube is impelled towards the ovary.

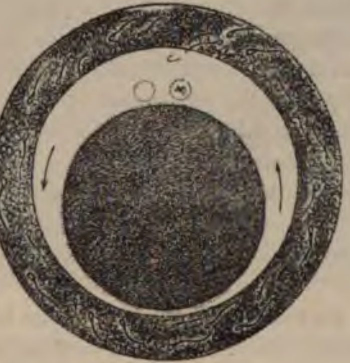
The process by which the ovum is conveyed along the Fallopian tube into the uterus is through the instrumentality of the ciliated epithelium lining the tube, which, according to Henle, vibrates only in a direction towards the uterus; this movement is further aided by the conversion of the tube into a number of minute capillary canals through the presence of small folds on its surface. It is also thought that some slight peristaltic action is exerted by the tube itself through its middle or muscular coat.

The time which is occupied in the passage of the ovum along the Fallopian tube is not known, but it is probably only a few days, and it is generally supposed that before it reaches the uterine cavity impregnation is effected by contact with the sperm-cells of the male; where this takes place exactly cannot for certainty be determined; it probably varies, and is possible at any point, as the teachings of extra-uterine gestation show. But wherever this contact is effected, whether in the uterus, as some affirm, or in some part of the Fallopian tube, as others maintain, or in the ovary itself, it is quite certain that the precise nature or character of the act of impregnation is invariable; the union of the male cell (the spermatozoon) with the female cell (the ovule) must be accomplished, or there is no embryo. It is also probable that in some cases the ovum does not enter the uterine cavity for several days after fecundation.

Supposing that impregnation has been accomplished, certain changes at once occur both in the ovum and in the uterus. In the former, the investment of nucleated cells lying in close contact with the *zona pellucida*, or bounding membrane of the ovum, which adhered to it as it left the ovisac, has already to a great extent disappeared, and with it the germinal vesicle. Spermatozoa now enter with great facility its outer covering (*zona pellucida*), and shortly afterwards a space is formed between this and the yolk by the contraction of the latter. These points are all very well seen in the annexed diagram (Fig. 25), after Bischoff, which represents the impregnated ovum of a rabbit. The spermatozoa are seen freely moving about within the outer covering or zona pellucida, and between it and the yolk a short space is seen. In this space one or two small granular bodies are developed, the purpose of which is not ascertained, but they are supposed to be in some way connected with the *segmentation of the yolk* which now takes place.

At first the segmentation is in two equal parts; each of these again subdivides, and so the process continues until the whole mass is broken up. It is supposed, however, that so soon as the yolk has subdivided into twelve or sixteen divisions, the ovum enters the uterine cavity, where the subsequent divisions are effected. Occasionally a gelatinous or albuminous covering is formed round the ovum before its exit from the tube. This covering is the representative of the albumen or white in the egg of the chick, and the membrane which incloses the yolk of the human ovum—here called the *umbilical* or *blastodermic vesicle*, or *germinal membrane*—corresponds with the vitellary membrane, or yolk-bag, in the egg. It is here that the first indication of the future embryo is seen, arising as an opaque round spot caused by an aggregation of cells—the *area germinativa*. Shortly afterwards the membrane in which this is formed is seen to divide into two layers, which afterwards take on different characters, and fulfil widely different offices. The innermost is the *mucous* or *vegetative layer*, destined to develop the nutritive organs; the outermost the *serous* or *animal layer*, in which are formed the vertebral column and organs of animal life. It is in this layer that the embryo is first seen. Beginning as a small groove between two oval bodies, the *laminæ dorsales*, it soon dilates in three separate places, which are afterwards occupied by three portions of the encephalon; about the same time, the laminæ dorsales rise up and arch over the groove, which they inclose, and thus is formed the cerebro-spinal canal, in which are soon seen the rudimentary nervous centres. Processes are then put out on either side, the *ventral laminæ*, in which are to be developed the ribs and transverse processes of the vertebræ. These subsequently unite in front, and in this way the abdominal cavity is formed.

FIG. 25.



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Before these changes are accomplished, however, a clear space appears in the area germinativa, called the *area pellucida*, around which is developed the *area vasculosa*. Both layers of the germinal membrane participate in this. "The first rudiment of the intestinal canal presents itself as a channel along the under surface of the embryonic mass, formed by the rising up of the inner layer of the germinal membrane into a ridge on either side." A tube is soon formed, which is thus, as it were, pinched off the vitelline sac; but an opening between the two still remains through the *vitelline duct*, until the abdominal walls are closed in.

Simultaneously with the occurrence of these changes is noted the first appearance of bloodvessels. These are seen in the vascular area ramifying over the membranes containing the yolk, and are soon very numerous, absorbing nutritive material from the yolk, and carrying it to the embryo. Subsequently they are collected into two principal trunks, the *omphalo-mesenteric*, or *vitelline vessels*.

The *heart* is formed in the vascular layer beneath the upper part of the spinal column. It is the earliest among the permanent organs of the embryo which is called into functional activity. At first it is simply cellular in structure, and resembles the permanent heart of the lower invertebrata; but it soon becomes bent upon itself, and is divided into three cavities—an auricle, a ventricle, and a bulbus arteriosus. At this period the circulation resembles that of fishes. The last change occurs at about the third month, when the circulation assumes the form it maintains to the end of fœtal life.

At about the time when the intestinal tube is being formed, out of the yolk-bag, as above described, folds of the serous layer rise up on either side the embryo; they arch over it and unite, and soon inclose it entirely. These folds are composed of a double membrane, which soon separates; the outermost layer removing away from the embryo, reaches the common envelope, and unites with it; while the inner layer remains, and forms the *amnion*. The formation of this structure, as well as the relations of the several parts of the ovum at a very early period of its existence, will be best understood by reference to the accompanying drawings, Figs. 26 and 27, which are taken from Valentin's *Textbook of Physiology*. They are intended to represent imaginary vertical and longitudinal sections through the centre of the ovum, which is represented at *a*, *b*. Two double folds of the germinal membrane, *f*, *g*, rise up at either end of the embryo, *a*, *b*, forming the involucrum capitis and involucrum caudæ. The same thing occurs also on either side of and all round the ovum, so that the latter is in a short time completely inclosed within these folds. Subsequently, fluid is formed both between the layers of the membrane in question, and also between its innermost layer and the embryo: this fluid is the rudimentary liquor amnii. The cavity next the embryo is the amniotic cavity, and the innermost membrane, *f*, *g*, is the amnion. The outermost one, *k*, *k*, Fig. 27, is a serous membrane, which, like the vitelline membrane, *c*, *c*, disappears in process of time, while the amnion, *f*, *g*, remains.

FIG. 26.

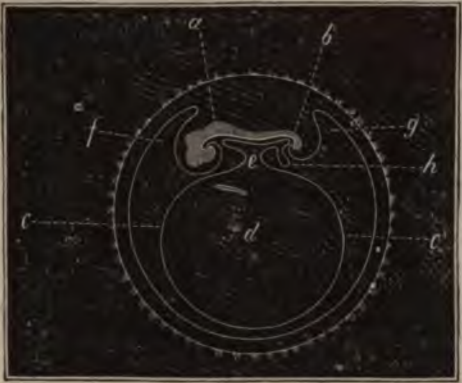
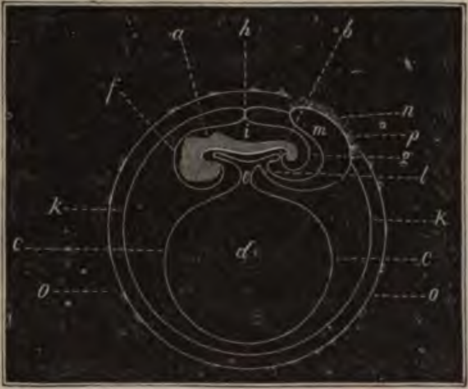


FIG. 27.



The umbilical vesicle, or yolk-bag, *d*, Figs. 26, 27, now separates from the abdomen by a constricted portion, the umbilical duct, *e*, *e*, communication being still kept up with the intestine through the vitelline duct. Here the umbilical cord is afterwards developed. During the earlier period of embryonic life a structure exists, which, in the case of birds, performs a very important office, viz., that of respiration; in man, however, it has but a temporary existence, and its function is at present doubtful; I refer to the *allantois*, *h*, Fig. 26.

The allantois appears as an offshoot from the lower extremity of the embryo, and is probably developed from the mucous layer; it exists as a small elongated vesicle, upon which, for a time, bloodvessels, the future umbilical arteries, ramify; it gradually enlarges, as is represented at *m*, Fig. 27, and comes in contact with the chorion on its outer surface, where it sends out a number of vascular villi. Ultimately its chief office is to convey vessels from the embryo to a small portion of the chorion, *n*, in which is afterwards developed *the placenta;* as soon as this has been accomplished, the function of the allantois is at an end, and it consequently disappears—the *urachus* or suspensory ligament of the bladder alone remaining in after life to show its former connection with that viscus.

A similar disappearance of the umbilical vesicle takes place, the yolk having been entirely appropriated, and the embryo being now nourished by means of the blood brought from the placenta; other structures serving merely a temporary purpose disappear, and are replaced by those of more permanent character. It is very interesting to note also, that most of these temporary formations, admirably adapted as they are for the then present condition of the embryo, are representatives of that which permanently obtains in some of the lower animals. It is so, in some respects, with regard to the earlier condition of the circulation of the human embryo, which, as I have said, resembles that of the fish; three or four branchial (?) arches start from the two sides of the aorta, which, after ramifying over small lobules on either side of the neck, the representatives of the gills in the fish, unite again as one trunk to form the descending aorta; this arrangement, however, exists but a short time; for, during the second month, those lobules disappear, and, as I have shown before, the heart undergoes about this time a corresponding change. In the subsidence of the so-called branchial arches, the upper pair afterwards become the subclavian and carotid arteries; in the second pair, that on the right is obliterated, the other becomes the arch of the aorta; while the lowest pair form the two pulmonary arteries; that on the left side, however, joins the descending aorta as before, and thus constitutes the *ductus arteriosus* (Carpenter).

The following short account of the development of the different organs, taken chiefly from Carpenter's *Physiology*, may be found useful.

The *Alimentary Canal*, as I have said, is formed from the vitelline sac or umbilical vesicle, with which a communication is kept up for some time. At first it exists as a narrow straight tube, having no division of parts, and no orifices; subsequently the mouth, œsophagus, stomach, and small and large intestines are formed; and it is at the junction of the two latter that the vitelline duct exists.

The *Liver* is formed upon the small intestine, and makes its appearance first at about the third week, by the aggregation of a number of cells at the spot where the hepatic duct afterwards opens: this increases, and gradually removes further from the canal; ducts begin to appear in it, starting first of all from the intestinal wall; and so rapid is the growth, that by the fifth week the organ is about one-half the weight of the embryo itself. The subsequent changes which take place consolidate it and adapt it to what we see at birth.

The *Pancreas* and *Salivary* glands are similarly developed as offshoots of the alimentary canal. It will be remembered that all the organs of vegetative life arise from the original inner or mucous layer of the area germinativa.

The *Lungs* arise at about the sixth week, as a pair of bud-like processes from the œsophageal portion of the alimentary canal; their surfaces soon become covered with numerous little wart-like projections, caused by corresponding enlargements of their cavity. This goes on increasing; the parenchymatous tissue is developed in the spaces between the bronchi, vessels are deposited in it, and by degrees these organs separate from the tube from which they spring, and assume more and more the natural state.

The *Urinary Organs* begin as two long tubes situate one on either side the spinal column; little cæcal appendages, the *corpora Wolffiana*, are developed on their outer sides; the ducts then enter the allantois, there being at present no proper urinary bladder; this takes place about the fifth week, and by the end of the second month they have disappeared. These take no part whatever in the development of the *Kidneys*, which begin to form at about the seventh week, behind the Wolffian bodies. At first as separate lobules, they afterwards coalesce; for some time the *Suprarenal Capsules* equal in size the kidneys, but at the sixth month the former rapidly decrease, while the latter as quickly increase in growth. The ureters at first open, with the duct of the Wolffian bodies, into the allantois; but as these bodies disappear a portion of the allantois is nipped off, and thus the *Urinary Bladder* is formed.

The *Generative Organs* are developed later than the other vegetative organs, and at first they present no essential sexual difference. This applies to both the internal and external organs, until at least as late as the fourteenth week.

The *Internal Generative Organs* appear first at the inner side of the Wolffian bodies. As development advances, the *Testes* become round, thick, vertical in direction, and are united to the *vasa deferentia;* the *Ovaries*, on the contrary, become long, flat, transversely situate, and remain unconnected with the *Fallopian tubes;* the former subsequently enter the scrotum, beginning the descent about the middle of pregnancy; the latter descend into the pelvis. The *Uterus* is formed by a coalescence of the inner extremities of the Fallopian tubes; it remains bifid or bihorned (the permanent condition of some animals) up to about the fourth month.

The developmental changes of the *External Generative Organs* are interesting, from the light it throws on some malformations incident to these parts. So early as the fifth or sixth week a common cloaca exists for the termination of the intestine, the urinary, and generative organs. At about the tenth week the former is separated from the two latter by a band, and subsequently these are shut off from one another by a similar band. Then the *labia majora*, or the two halves of the scrotum, as the case may be, are developed on either side the orifice of the genito-urinary canal; and above and between these a small body protrudes, being surrounded with a *glans*, and fissured on its under surface. This becomes the *clitoris* in the female, and, by future growth, the *penis* in the male. The margins of the fissure are, in the former, developed into the *nymphæ;* in the latter, they unite and form the *urethra*. It will now be readily understood how, by arrested, or morbidly augmented, development of these parts, *hermaphrodism* or other deformities may result.

Turning now to the *Organs of Animal Life*, a few words upon the development of the *Cerebro-spinal axis* may fitly terminate the consideration of the embryological changes affecting individual organs. This, as has already been stated, takes its origin in the external, serous, or animal layer of the germinal membrane, by a contribution from each side of the primary groove, formed by the rising up of the laminæ dorsales: it is, in fact, from a portion of these latter, at first separate, but afterwards united, that the central nervous system arises. The encephalic portion consists at first of three vesicles: out of the first is formed the great portion of the *cerebral hemispheres*, the *corpora striata, optic thalami*, and *third ventricle;* out of the second, the *corpora quadrigemina*, and *crura cerebri;* and out of the third, the *cerebellum, pons Varolii*, the *medulla*, and *fourth ventricle.* At first, all these vesicles are arranged in a straight line, very much like the permanent condition of the brain in fishes, but a curve is formed about the seventh week, the hemispheres arching over the thalami and corpora quadrigemina. The *lateral sinuses* are formed about the third month, the *corpus callosum* in the fifth, and *convolutions* appear at the fourth. The *membranes* of the brain are formed at about the sixth or seventh week, the arachnoid rather later. They are developed from the primary encephalic mass.

Having now given the chief features connected with the development of the internal organs of the fœtus, it may be worth while to notice some of the more obvious external characters by which the age of a fœtus may at a given time be distinguished; only those well authenticated will be noticed, and such as the average presents. Fuller details may be seen in Devergie's *Médecine Légale.*

At the end of the *first month*, the body is elongated, straight, attached at its lower extremity by a very short cord to the membranes, concave in front, convex behind; head but slightly distinguishable; no appearance of extremities; bladder and liver very large; the mouth represented by a cleft; the eyes shown very faintly by two dark spots; average length about half an inch; whole surface of chorion, villous.

During the *second month*, the body is curved; head very large, but the neck scarcely defined; face with its openings perceptible; extremities quite distinct, the upper usually appearing first near the head, and at about the fifth week; the lower near the anus; umbilical vesicle, the size of a large pea, situate close to the abdominal wall, but external to the amnion; umbilical cord distinct, and composed of omphalo-mesenteric vein and artery, two umbilical arteries and vein, the urachus, and duct leading from the umbilical vesicle to the intestine, which is said afterwards to constitute the vermiform appendage; the heart and genitals visible; average length at the end of second month about 1½ inches; chorion distinct from amnion, formation of placenta commencing.

At the end of *three months*, extremities divided into their separate parts; fingers and toes webbed; genitals quite distinct; lungs, thymus, spleen, suprarenal capsules, and kidneys distinct, the latter lobulated; cerebro-spinal axis divisible into its leading parts, and nervous structure apparent, though its consistence is very soft; ventricles of the heart separate; eyelids joined together, pupillary membrane visible; mouth and anus closed; nose and ears present; insertion of the cord, removing from the pubis higher up the abdomen: this it continues to do during the rest of intrauterine life; average length about 2½ inches. The two deciduæ are in contact, the placenta is separate; the allantois, umbilical vesicle and its vessels, have disappeared.

At the end of the *fourth month*, the sexes are distinguishable; mouth and anus open; nails and gall-bladder appearing; meconium present in upper bowel; cæcal valve and membrana pupillaris distinct; chorion and amnion united; average length about 5½ inches, and weight 3 ounces.

At the end of the *fifth month*, the skin is tolerably dense, nails and hair traceable; head, heart, and kidneys large: gall-bladder formed; white matter of brain present; average length 6 inches, weight 6 ounces. At this time the movements are usually plainly felt by the mother.

At the *sixth month*, the liver is large and red; the gall-bladder contains some fluid, not bitter; testes near the kidney; meconium in the large intestine; hair distinct; eyelids closed; pupillary membrane still present; skin fibrous, and covered with sebaceous matter; weighs about 1 pound, and usually is about 9 inches long.

At the end of the *seventh month*, the brain presents greater firmness; eyelids open, pupillary membrane ruptured; skin much firmer and red; nails more distinct; valvulæ conniventes appearing; cæcum situate in the iliac fossa; bile present in gall-bladder;

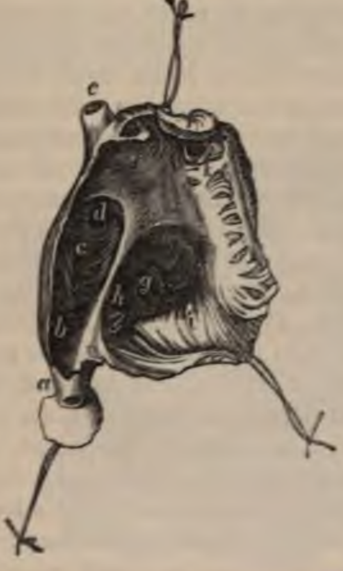
kidneys consolidated, lobules disappeared; testicles descending; weight about 3 pounds, length 13 inches.

At the end of *eight months*, convolutions of brain appearing; pupillary membrane gone; skin covered with sebaceous matter; nails at the end of fingers; testicles in the inguinal canal; average weight 4½ pounds, length 15 inches.

At *full term*, the white and gray matter of the brain are distinct, convolutions well marked; nails horny, and reaching beyond the fingers, those of the toes not quite so long; the skin is deep red, and covered with a variable quantity of sebaceous matter; hair more or less abundant; testes in the scrotum; meconium in the rectum; the umbilicus is situate just midway between the head and feet; the usual weight is from 6 to 8 pounds, length from 18 to 20 inches.

In the above account no mention is made of the *progress of ossification*, as it appears desirable to say a few words separately on this subject, with the view of facilitating the remembrance of its chief points. The first ossific point occurs in the clavicle, at about the sixth week; this is speedily followed by another in the lower maxilla; then successively in the vertebræ, humerus, femur,

FIG. 28.



ribs, and occipital bone. At the beginning of the *third month*, ossification commences in the scapula, frontal bones, radius, ulna, tibia, fibula, and superior maxilla; by the end of the same month, it may be seen in the metatarsal, metacarpal, and phalangeal bones, together with most of the cranial bones. During the *fourth month* the iliac bones and those of the internal ear, with the upper part of the sacrum begin to ossify. In the *fifth month*, the ethmoid, pubis, ischium, and calcanean bones commence their ossification. The *sixth and seventh months* see the astragalus beginning. In the *eighth month*, the last bone of the sacrum, and sometimes the os hyoides; very often, however, this is not ossified even at full term. At the *ninth month*, the occipital bone still remains in four portions; the external auditory canal is ossified; the last piece of the coccyx, the patella, the carpus, the five small tarsal bones, the epiphyses of the long bones, and the sesamoid bones, are still in a cartilaginous condition.

Before quitting the consideration of the development of the ovum, the *peculiarities of the fœtal circulation* may be here explained. It may be broadly stated, that the inability on the part of the fœtus to perform the respiratory function, in consequence of its being enveloped in the liquor amnii, is the starting-point whence all the peculiarities in its circulation spring; for the lungs not being employed, they are small and collapsed, and very much resemble the liver in appearance; hence only a little blood can pass through them, since the amount is regulated by the pervious condition of the air-cells. In consequence of this, the pulmonary arteries are very small, and the exit of blood from the right side of the heart would be thereby impeded but for the existence of the *foramen ovale* (*d*, Fig. 28), which permits some of the blood to flow from the right to the left auricle. In spite, however, even of this safety-valve, as it may be called, there is yet more blood passing into the right ventricle than the pulmonary artery can convey away; hence another arrangement, the *ductus arteriosus* (*g*, Fig. 29), a short thick trunk connecting the pulmonary artery (*e*, Fig. 29) with the aorta (*f*), and allowing free escape from the ventricle. The right and left ventricles thus become one, as it were, and the blood from each enters directly into the aorta; the two auricles thus become one through the medium of the foramen ovale: the heart, therefore, and the circulation of the fœtus, at this time resembles that of a reptile.

In the pelvis, after the division of the common iliac arteries into internal and external, the latter go to supply the extremities, while the former find their way at once to the umbilicus as the *umbilical arteries*, and are destined through the cord to reach the placenta; returning from the placenta, they unite to form the umbilical vein; in this way the blood re-enters the abdomen at the umbilical orifice, it then passes upwards and along the anterior edge of the suspensory ligament of the liver, giving branches to that organ; after that it joins directly the ascending vena cava

FIG. 29.

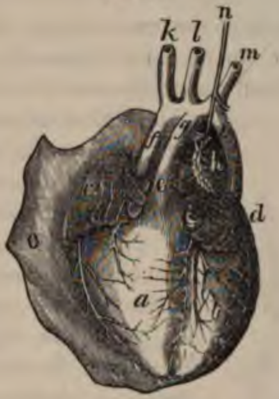
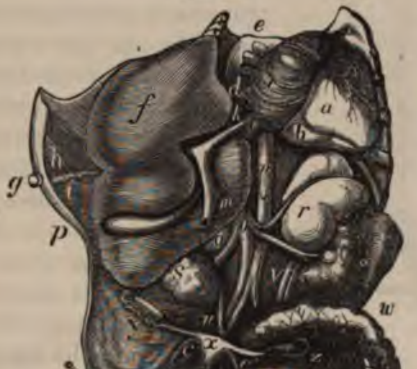


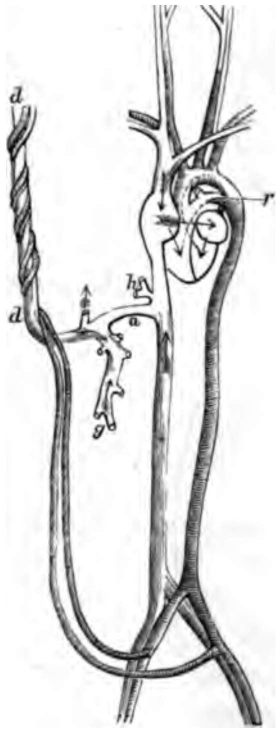
FIG. 30.



by a short trunk, called the *ductus venosus*, or duct of Arantius, which is represented at *k* (Fig. 30). This arrangement, which is for no other purpose than the purification of the fœtal blood, is also consequent upon the non-performance of the respiratory function.

The following, then, is the course taken by the blood in the fœtus: starting from the placenta it goes by the umbilical vein, carrying arterial blood along the cord into the abdomen of the child, and up to the liver, *g*, *i*, Fig. 30; part goes to it, and part passes on through the ductus venosus, *k*, to the vena cava ascendens, whence it enters the right auricle, *c*; then it passes through the foramen ovale to the left auricle, and so enters the left ventricle, while the right ventricle, *a*, is filled with the blood which the right auricle, *c*, receives from the descending cava. The two ventricles contracting, the aorta is filled directly by the left ventricle, and indirectly also by the right, through the intermediary pulmonary artery and ductus arteriosus: through the aorta the blood passes upwards to the head and upper extremities, and downwards to the trunk and lower extremities; having arrived at the internal iliacs, the blood makes a speedy exit from the abdomen through the umbilical arteries, which are now carrying venous blood, and thus it reaches the placenta, the point from which it started. All these points are well seen in the annexed illustration, Fig. 31, which represents the course of the fœtal circulation: at *d* is represented the umbilical vein bringing from the placenta to the fœtus the oxygenated blood: this divides in the abdomen of the fœtus; part goes, together with that collected from the intestines, as shown at *g*, into the liver, and finally enters the vena cava at *h*, while the larger part goes direct to the vena cava through the ductus venosus, *a*, and so on to the heart by the right

FIG. 31.



auricle, thence to the left auricle by the foramen ovale, and on to the left ventricle, whence it goes to the head and upper extremities. At *r* is represented the ductus arteriosus.

After birth a great change is effected in the course of the circulation; consentaneous with the first inspiration, the air-cells of the lungs are opened up, the capillary surface is consequently considerably increased; a much larger quantity of blood passes into them; the ductus arteriosus is no longer required, it is stretched by the distension of the pulmonary artery; its calibre is consequently diminished, and ultimately it becomes obliterated. At the same time the right auricle throws all its blood into the right ventricle; the left auricle is filled with blood from the lungs by the four pulmonary veins, and becoming gorged, the blood closes the foramen ovale by the attempt to flow backwards into the right auricle; and hence, in a little while, the septum between the two auricles is made perfect. Moreover, the circulation being arrested through the umbilical arteries, they shrivel up from their origin at the internal iliac artery, and the same thing happens from the same cause in the case of the umbilical vein and the ductus venosus. Thus the circulation is established as it is afterwards to be maintained in adult life.

Thus far the development of the ovum alone has been considered, apart from the structures with which it is associated, and by which its connection with the mother, and consequently the preservation of its life is maintained; these latter must now be described. And first, with regard to the *Decidua;* this membrane does not strictly belong to the ovum, but is a maternal structure developed from the uterine parietes, and serves to connect the ovum with the uterus, so as to furnish it with materials for its future development. Some time before the ovum reaches the uterine cavity, and while still in the Fallopian tube, the mucous membrane of the uterus becomes swollen and congested, soft and spongy—in fact, hypertrophied; this condition is principally seen in the epithelial layer; but not only is the epithelium increased, the glands are much enlarged, the simple ones become compound, and the whole structure shows evidence of considerable hypertrophy, though no new product is thrown out.

The same phenomena occur even when the ovum does not reach the uterine cavity, as in extrauterine gestation. To this condition of the mucous membrane the title of *decidua* is given: many different opinions have been held as to the origin of this structure;

that which was most common assumed it to be an inflammatory product, much of the same nature as the exudation in croup. This was John Hunter's view; his brother William, however, regarded it as "an efflorescence of the internal coat of the uterus itself, the internal membrane of the uterus;" and subsequent observation has tended to confirm this opinion. Some observers, of whom Dr. Robert Lee is the chief, disbelieve in its uterine origin, and regard it as a distinctly ovular membrane: but against this view may be mentioned the fact that it is seen in the uterus even before the ovum enters that cavity, that it is found there also in extrauterine pregnancy, that its vessels are derived from the uterus, and that in structure it exactly resembles the mucous membrane of the uterus: these considerations afford conclusive evidence of its real nature and origin. It originally assumes the triangular shape of the uterine cavity, and very frequently contains three openings corresponding with the orifices of the Fallopian tubes, and cervix; these, however, are not constant.

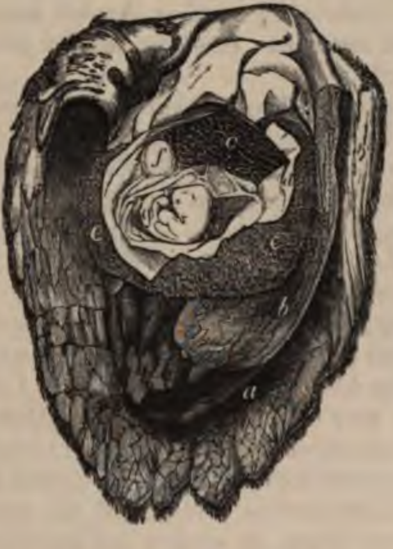
In the early months of gestation the decidua exists as two separate layers: an outer, called also *decidua vera, decidua uteri,* or *parietal decidua,* which is the best term for it; and an inner layer, the *decidua reflexa, decidua chorii,* or *decidua ovuli*—the latter seems the fittest appellation. In Fig. 32, page 75, these structures are represented at *a, b.*

The *parietal layer* (*a*, Fig. 32), or that immediately lining the uterine cavity, presents on its *external surface* a very shaggy appearance, the small projecting filaments being thought by some to be the utricular glands detached from the substance of the uterus. Dr. Priestley, however, believes that they are nothing more than fibro-cellular structures, which exist also in the deeper layers of the decidua; they are no doubt caused by the tearing away of the membrane from the proper tissue of the uterus. Besides these may be seen small cup-shaped eminences having minute apertures at their summit leading into little cup-like cavities; these are more properly the remains of the uterine glands. The appearance presented by the *internal surface* of this parietal layer is widely different from the above: it is quite smooth and shining, but "elevated into numerous projections, which may be roughly compared to the cerebral convolutions" (*Farre*). The entire surface is covered with minute apertures, which are found to be continuous with those already mentioned as existing on the outer surface, and are believed to be the orifices of the uterine glands; they are lined with epithelium. Thus these glands, which in the unimpregnated state are indistinguishable, except with the microscope, may be readily seen even with the naked eye in the early weeks of gestation.

If we examine the intimate structure of the decidua at about the sixth week, we find it is composed of large round and oval cells, nuclei, and fat-granules, with elongated fibre-cells; the whole so bound up that if we spread out a portion of the membrane, and examine it with the microscope, "it is observed to be readily separable into irregular portions or fragments, with clear interspaces—very much, in fact, like a web or network—formed by the superposition of several layers of a cribriform membrane one upon another" (Priestley's *Lectures on the Development of the Gravid Uterus*).

The *inner layer*, or *decidua ovuli* (*b*, Fig. 32), that which invests the ovum, is composed of almost precisely the same histological elements as the parietal layer; indeed, it is but a part of the same structure, presenting on its outer surface numerous orifices of uterine glands, and on its inner or ovular surface a number of depressions corresponding to the villi of the chorion. The chief

FIG. 32.



interest which attaches to it has reference to its formation. Dr. William Hunter, who gave to it the name *reflexa*, believed that it was formed by the ovum, as it entered the uterine cavity from the Fallopian tube, thrusting it away from the uterine wall, and so enveloping itself, as it were, by it; just as the heart is enveloped by the pericardium. Sharpey and Coste suppose that the ovum becomes imbedded in a fold of the decidua, which then grows up round it and incloses it. Farre supposes that the ovum, when it reaches the uterine cavity, "drops into one of the orifices leading to the utricular follicles, and in growing there draws around it the already formed but soft and spongy decidua constituting the walls of the cavity;" while Weber suggests that there are two layers of decidua formed, the one before the other, after the ovum leaves the Fallopian tube; that they remain connected in one-third of their extent, and that the ovum occupies the first formed, which thus becomes the so-called *reflexa* (*b*, Fig. 32). That portion of the decidua where the two layers are united together, is called the *decidua serotina*, so named by those who believe that the reflexa is a reflection of the parietal layer; which thus leaves the uterine surface denuded, and so necessitates this subsequent secretion. It is here that the placenta is afterwards developed.

By the formation of these membranes the uterine cavity is obviously divided into two: the one contains the fœtus; the other is called the decidual cavity. As the former cavity expands, the latter diminishes; and at about the fifth or sixth month disappears—some say by the fusion of the two laminæ, others by the atrophy and disintegration of the ovular layer. No decidua is formed in the cervical portion of the uterus.

The following series of illustrations represent pretty accurately, I believe, though of course in a diagrammatic way, the mode of formation of the decidua. For these diagrams I am indebted to the admirable work of Professor Dalton on *Human Physiology*. In all of them the black portion is intended to represent the decidua, and the round body the ovum; the cervix, it will be seen, takes no part in this process. At Fig. 33 the ovum is seen just imbedded in two folds of the swollen and hypertrophied mucous membrane, with which it soon contracts an adhesion, and now an extraordinary amount of activity takes place, by means of which the inclosing folds of mucous membrane arch up and gradually cover over the whole surface of the ovum, as is represented in Figs. 34, 35. The enveloping mucous membrane forms the decidua reflexa, and it will be observed that between it and the parietal layer, or decidua vera, which lines the uterine cavity, there is now formed a separate sac, while the ovum also is inclosed in another distinct and separate cavity. After awhile, union between the ovum and its containing sac takes place, and it is brought about in the following manner. Shortly after the ovum reaches the uterine cavity, and when it is being invested with the decidua reflexa, certain villosities which have formed on its surface begin to project into the uterine tubules or follicles. This takes place over the whole circumference of the ovum, and thus it is that the chorion is formed, for these villosities become vascular tufts, each carrying a loop of vessels which dip down as it were, like rootlets, into the vascular decidua and so imbibe their nutritive fluid. This process is represented diagrammatically in Fig. 36. Later on some of these tufts disappear, while others increase and multiply at a particular point, become branched and complex and extremely vascular, and finally at this point the placenta is developed out of these vascular tufts, as is represented in Fig. 37.

FIG. 33.

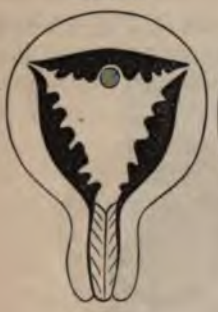


FIG. 34.

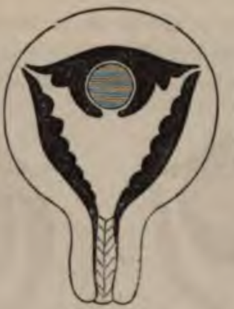
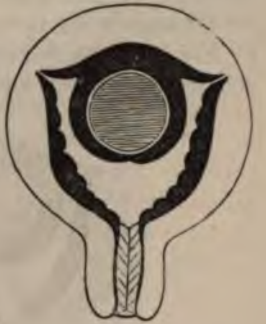


FIG. 35.



Numerous bloodvessels pass from the uterus into the decidua; they there form capillary loops among the glandular tubules, which freely anastomose with one another.

The *Chorion* (*e*, Fig. 32) is the structure lying next in order to the decidua, and is the first of the fœtal envelopes met with in dissecting an aborted ovum; internal to it is the sac of the amnion. The chorion begins to be formed in the Fallopian tube as an albuminous layer enveloping the ovum; but as soon as it reaches the uterine cavity a number of small tubular projections—the chorion villi—start from every point of its outer surface. At first these are simple straight tubes, with blind extremities, which are imbedded in the substance of the decidua like rootlets, serving to keep the ovum in its place, and also to supply it with nourishment. At this time no vessels exist in it, but at about the second month the vascular sac of the allantois (*h*, Fig. 26, and *m*, Fig. 27) comes into contact with the inner surface of the chorion, forming its inner layer, or *endochorion*, and then capillary twigs are sent into the hollow villi; these now take on a rapid development; they become compound branching tufts, inclosing capillary vessels, which are brought into close interdigitating communion with the capillaries ramifying in the decidual membrane; so intimate is the union in later months, that it is impossible to unravel the meshes. These tufts are composed externally of a layer of cells, readily separable from the fibrous coat which makes up the bulk of the trunk, and which incloses the vessels within.

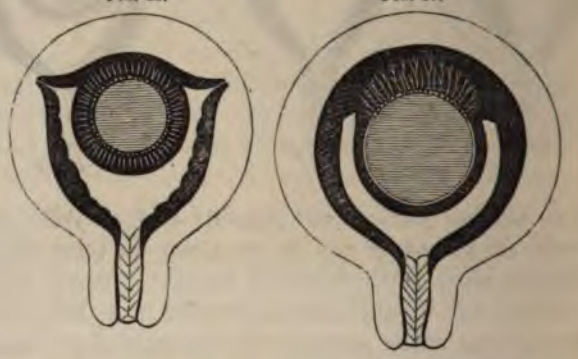


FIG. 36. FIG. 37.

During the first three months of gestation every part of the chorion remains covered with villi, giving it the appearance, when placed in water, of a beautiful white shaggy, or woolly membrane. After this time, however, a great number of the villi begin to disappear, so that a large portion of the external surface becomes smooth, except within the site of the placenta, where they increase enormously, becoming at the same time more convoluted, and constituting the fœtal portion of that organ, their trunks uniting to form the umbilical vessels. The inner surface of the chorion is smooth, like mucous membrane; no nerves or lymphatics have been traced in it.

Immediately investing the embryo, and lying internal to the chorion, is the *Amnion*, *f*, *g*, Figs. 38, 39, a thin transparent membrane, but possessed of much strength. It exists at a very early period of development; at first slightly separated from, it afterwards comes into contact with, the chorion, and is continuous with the common integument of the embryo, being reflected from it over the umbilical cord. Over the site of the placenta it becomes firmly adherent to the chorion. Its inner surface resem-

FIG. 38.

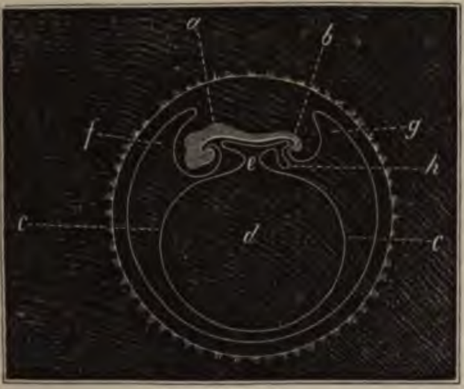
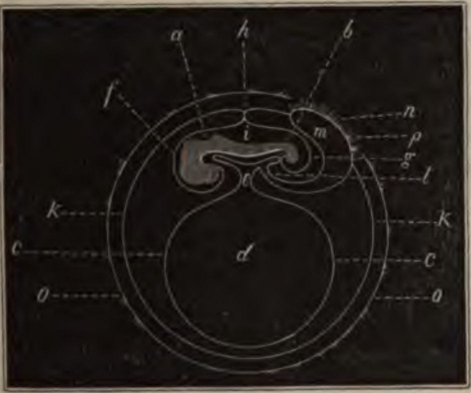


FIG. 39.



bles a serous membrane, and serves to secrete a fluid called the *liquor amnii*, in which the embryo floats; its outer surface is rather rough, and has a reticulate appearance. During the first few months of, and sometimes even throughout, gestation, when a space exists between this and the chorion, a fluid is contained therein, called the *liquor allantoidis*, or *liquor amnii spurius;* it is this which often escapes early in the commencement of labor sometimes even days or weeks before that, and gives rise to the opinion that the membranes have ruptured.

In structure the amnion consists of a fibrous membrane, covered with a layer of oval nucleated epithelial cells, but containing neither vessels nor nerves.

The *Liquor amnii* is the fluid contained within the amniotic cavity; at full term it varies in amount from eight to sixteen ounces; and relatively to the weight of the fœtus it varies constantly throughout pregnancy. At first it weighs considerably more than the embryo; towards the middle of pregnancy it about equals it; while at full term it varies from $\frac{1}{8}$ to $\frac{1}{12}$ or less of the weight of the fœtus. This altered relation of the amount of liquor amnii to the fœtus is important in reference to the practice of puncturing the uterus in order to let off this fluid in cases of otherwise irreducible retroflexed gravid uterus; for obviously this fluid, at a time when it is much more in amount in proportion to the size of the fœtus, is more important in its results than at the later periods of pregnancy when this proportion is reversed; in the former case the uterus is relatively more reduced in size than it could be in the latter case. At first the liquor amnii is clear, but it becomes slightly turbid, and is of alkaline reaction, with a specific gravity a little above that of water; it contains a small quantity of albumen and gelatin, a trace of phosphate of lime, chloride of sodium, and ammonia. Its source is still unknown; it is probably supplied by the amnion as a true secretion. Meckel thought it came from the maternal vessels.

The liquor amnii has been considered a source of nutrition to the embryo in the early weeks, as it is known then to contain more nutritious elements than at a later period, when its uses appear to be simply mechanical. "It secures the fœtus against external pressure or violence, and supports the regular distension of the uterus; on the other hand, it diminishes and equalizes the pressure of the fœtus upon the uterus; during labor, by distending the membranes into an elastic cone, it materially assists to dilate the os uteri; it also serves to lubricate and moisten the external passages."

The *Placenta* is the most important of all the temporary embryonic structures, and may be said to perform the functions of both lungs and stomach to the fœtus. Great diversity of opinion has existed with regard to the anatomy and physiology of this organ, and the conflicting descriptions given in different obstetric works by no means tend to lighten the confusion which surrounds the subject.

It is not until towards the end of the second month that the placenta begins to be formed, and it gradually increases in size to the end of gestation; it then forms an irregular oval mass about eight or nine inches long, and six or seven wide, with a thickness varying from one to two and a half inches, according as the organ is empty or filled with blood. The weight has been variously estimated at from fifteen to thirty ounces.

The most frequent *situation* is at the upper and back part of the uterus, and it is more often attached to the left than the right side, near to the orifice of the Fallopian tube. No reason can be assigned for this; nor is there anything like uniformity in regard to its site. According to the late Mr. Carmichael, it was much more frequently at the lower part of the uterus, generally posteriorly, but occasionally anteriorly, and, as is well known, it is sometimes situate near to, or even over, the os uteri.

The placenta has *two surfaces*, a fœtal and a uterine; the former receives the insertion of the umbilical cord; it is smooth and shining, from being covered with the amnion, through which, and projecting above its surface, may be seen the chief divisions of the umbilical vessels ramifying over this surface of the placenta.

Immediately beneath the amnion and loosely connected with it, lies the chorion, which enters largely into the formation of the placental mass, giving strength to it, and transmitting the branches from the subdivision of the umbilical vessels.

The substance of the placenta is made up of two distinct portions, the fœtal and the maternal; in the early months of gestation these are much more distinct and separable than subsequently, but although they become in later months most intimately and intricately interwoven, so as to render any separation an impossibility, yet in reality to the very last they maintain a perfectly independent connection.

The *fœtal portion* of the placenta receives the branches of the two umbilical arteries, which, when they first reach the surface of the organ, divide each into two; this dichotomous division takes place again and again, until the vessels are reduced to about the size of a crowquill, when they dip down into the chorion, passing through it to enter the substance of the placenta, numerous branches being everywhere given off from the main vessels to enter the organ. After splitting up to form the ultimate ramifications and fœtal villi, all the blood is again returned by sixteen veins, which join the chief branches above mentioned, following them side by side on the surface of the placenta, and ending in the one umbilical vein.

The *uterine* portion of the placenta is seen to be divided into a number of small lobules or cotyledons, of from half an inch to one and a half inches in diameter, and over all is spread a soft pulpy membrane, the *placental decidua* or *decidua serotina*, which dips down into the sulci, much as the pia mater does in the brain; it separates the placenta from the proper tissue of the uterus, and in it are imbedded the uterine vessels which pass to and from that organ. "Numerous valve-like apertures are observed upon all parts of its surface. They are the orifices of the veins which have been torn off from the uterus. A probe passed into any of these, after taking an oblique direction, enters at once into the placental substance; small arteries, about half an inch in length, are also everywhere observed imbedded in this layer. After making several sharp spiral turns they likewise suddenly open into the placenta. These are the uterine vessels which convey the maternal blood to and from the interior of the placenta" (*Farre*). The placenta proper is thus seen to be inclosed between the two membranes, the amnion and the decidua serotina, which cover its fœtal and uterine surfaces; at its circumference they become united, and then spread out to inclose the liquor amnii and fœtus.

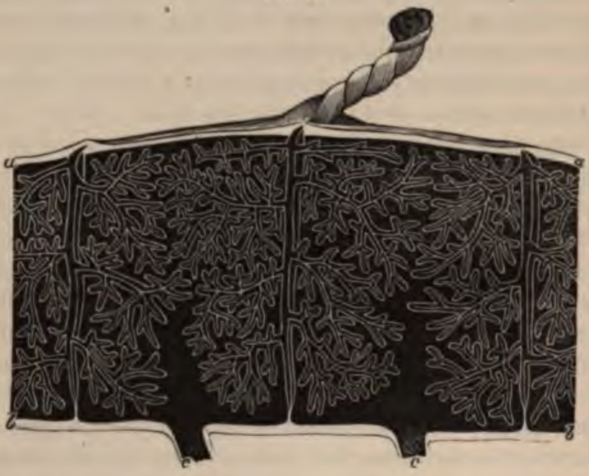
Between the two portions of the placenta above described are situated the *fœtal villi;* these form the important part of this organ by means of which all the nutriment bestowed by the mother on the fœtus is absorbed; they spring from the chorion and penetrate the placental decidua. Between their ramifications are certain spaces called placental cells, in which the maternal blood circulates, and here it is that the fœtal villi absorb the nutritive elements. Taking a single villus for examination at about the sixth month, it will be found to contain one or more arterial trunks, which give off a great number of smaller branches, spreading out in different directions, and giving to the whole a more or less arborescent appearance; these smaller branches break up into a minute capillary plexus, from which the blood is collected again into small veins which pass out of the villus alongside the corresponding artery. Each villus, with its subdivisions, is inclosed in a tolerably firm sheath, and the space between the vessels and the containing sheath is filled up by a pulpy granular substance.

The condition just described does not, however, continue throughout pregnancy, for at full term, as was demonstrated by Goodsir, one vessel only enters each tuft and forms a single loop; it then either returns or divides into one or more twigs. But in all cases, and at all periods, the tips of the villi reach the placental decidua and are imbedded in it.

On the maternal side no such arrangement as the above exists: "the maternal vessels all terminate at once and abruptly upon the inner surface of the decidua." After the vessels have left the uterine tissue they open suddenly into the placental cells, which are spaces between the fœtal villi, and the blood is returned from these cells to the uterine sinuses by veins which begin in the cells just as the arteries open there. The placental cells are all lined by a membrane which is continuous with the vascular system of the mother, "so that when the blood of the mother flows into the placenta through the curling arteries of the uterus, it passes into a large sac formed by the inner coat of the vascular system of the mother, which is intersected in many thousands of different directions by the placental tufts projecting into it like fringes, and pushing its thin walls before them in the form of sheaths, which closely envelope both the trunk and each individual branch composing these tufts. From this sac the maternal blood is returned by the utero-placental veins, without having been extravasated, or without having left her own system of vessels. The blood of the mother contained in this placental sac, and the blood of the fœtus contained in the umbilical vessels, can easily act and react upon each other through the spongy and cellular walls of the placental vessels and the thin sac ensheathing them, in the same manner as the blood in the branchial vessels of aquatic animals is acted upon by the water in which they float."—*Dr. John Reid.*

The subjoined illustration (Fig. 40) represents very well a diagrammatic vertical section of the placenta. "At *a a* is seen the chorion, receiving the umbilical vessels from the body of the fœtus through the umbilical cord, and sending out its compound and ramified vascular tufts into the substance of the placenta. At *b b* is the attached surface of the decidua, or uterine mucous membrane; and at *c c* are the orifices of uterine vessels which penetrate it from below. These vessels enter the placenta in an extremely oblique direction, though they are represented in the diagram, for the sake of distinctness, as nearly perpendicular. When they have once penetrated, however, the lower portion of the decidua, they immediately dilate into the placental sinuses (represented in the diagram in black), which extend through the whole thickness of the organ, closely embracing all the ramifications of the fœtal tufts."—*Dalton.* At this stage, then, the placenta is simply a mass of bloodvessels, having no other structure whatever in its composition.

FIG. 40.



It will thus be seen that *there is no direct vascular communication between the mother and the fœtus*, and hence all the eliminative changes necessary for the depuration of the fœtal blood, and the passage of all nutritive materials required for the growth and development of the fœtus, take place by endosmosis through the ends of the fœtal tufts which are being constantly bathed by maternal blood, and thus act the part of both stomach and lungs to the fœtus. The two bloods are kept apart by three structures,—the capillary wall, the containing membrane of the tuft, and the lining membrane of the placental sac, which is a maternal structure.

All attempts to discover any *nervous connection between the fœtus and the mother* have hitherto entirely failed; no one has yet ventured to affirm the existence of nerve structure in the umbilical cord, nor has a trace been discovered in the placenta itself; yet if it be true, as some believe, that the mind of the mother can influence the child so as to produce all kinds of deformity, it would seem necessary to establish some sort of nervous communion. For my own part, I never could adopt the theory in question, and strangely coincident as are many of the cases which have been recorded, they have never yet presented to my mind any logical proof in support of it. It seems to me unwise to accept a theory which may bar the way to future investigation, and the acceptance of which, in my judgment, creates far greater difficulties than those it is intended to explain. Why the fœtus in utero should be more amenable to maternal fancies than any other part of her body, the nervous connections of the two being remembered, I am at a loss to conceive, and methinks it would puzzle the most impressionable mother to produce any monstrosity of her own person by mental agency; yet if this be impossible why is not the other? One can easily understand how the child, *as a whole*, may be affected through the mother, and how peculiarities in the parent are transmitted to the offspring; these are produced in the same way as family likenesses: but it is by no means easy to understand how a *particular part* of a child can by its mother's mind become affected in a particular way; and, I repeat, that the advocates of such a theory have hitherto established nothing beyond the mere coincidence, which, strange as it is, is nevertheless no *proof*.

The *Funis*, or *Umbilical Cord*, serves to connect the fœtus with the placenta, and is the only bond of union between the mother and the child; to the latter it is attached at the navel, and its other end is inserted into the placenta. Generally the centre of the placenta is the point of attachment, but sometimes it is nearer the edge, and, in fact, it may be anywhere. The funis varies greatly in length at full term—its usual length is from eighteen to twenty inches; but it has been met with as long as fifty-six, and as short as five inches. Externally it is invested by the amnion, within which is a layer of the chorion, the substance of the cord being made up of the umbilical arteries and vein, which are imbedded in a sort of gelatinous material, consisting of a very delicate cellular structure infiltrated with albuminous matter. Earlier in fœtal life it also contains a portion of the intestinal canal, the urachus, the umbilical vesicle, and the omphalomesenteric vessels.

In the first three or four weeks of pregnancy there is no trace of any cord, the ovum being attached by its lower extremity to the containing envelopes: at about the fifth or sixth week of gestation it appears as a very short thick cord, the vessels in it then running in a *straight* direction from the fœtus; this they continue to do until the end of the second month, when, with the gradual lengthening of the cord, they take a *spiral* form, which is usually from left to right. There are always two arteries and one vein, the blood from the common iliac arteries of the fœtus being carried to the placenta along the former, while that from the placenta to the fœtus is conveyed by the one umbilical vein, which accordingly equals in size the two other vessels. There are no valves in this vein.

As was before stated, no nerves have yet been detected in the umbilical cord, nor are there any bloodvessels in its structure; but some lymphatics have recently been discovered, and Virchow has made some interesting observations on the structure of the gelatinous material in which the umbilical vessels are imbedded, which will be found in his *Cellular Pathology*.

The cord generally floats about in the liquor amnii; sometimes it gets coiled round the neck, at other times round one or other extremity; and it has been supposed that in cases where a limb, or part of a limb, has been missing, it has been brought about by the cord being so tightly twisted round the part that strangulation and amputation have resulted; the possibility of such a thing happening has, however, been disputed, from the idea that a degree of tightness requisite for such strangulation would necessarily prove fatal to the child by arresting the circulation in the cord.

CHAPTER IV.

DEVELOPMENT OF THE GRAVID UTERUS.

THE changes which take place in the uterus during gestation are very remarkable, and are deserving of much attention; the more so, perhaps, as they are now pretty well understood; they relate chiefly to the dimensions, weight, and position of the organ, and the minute anatomy of its several component tissues.

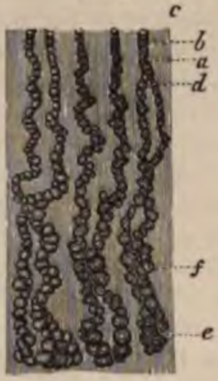
In the virgin state the cavity of the organ measures about 2¼ to 2½ inches long, and is about 1⅓ inches broad at its widest part between the orifices of the Fallopian tubes; its weight is from 1 oz. to 1½ oz. At the full period of utero-gestation it measures about 12 inches long and 9 inches broad, and weighs at the least 2 lbs. In its contracted and empty state immediately after labor, it forms a mass as large as the child's head at term, having walls fully one inch in thickness. It is in the proper tissue of the uterus that this enormous development takes place, and that chiefly in the body of the organ; the cervix not sharing in it in anything like an equal degree.

The mucous or lining membrane of the uterus also becomes considerably hypertrophied, the change commencing very speedily after impregnation has occurred. In Fig. 41 is represented the hypertrophied condition of the uterine tubular glands; their orifices are seen to open freely on the surface of the mucous membrane, below which the tubes are observed to be very irregularly lobular, sometimes remaining throughout single, but at other times dividing and uniting again.

The principal changes, however, which are of practical importance to the obstetric practitioner, are those which take place in the cervix; from them we may often derive most valuable information in cases of doubtful pregnancy. This part of the subject will be considered at length in connection with the signs of pregnancy.

The increased growth of the uterine tissue is due to the formation of new material as well as to the further development of that previously existing. It is now generally understood that the fibrous texture of which the uterus is composed in the unimpregnated state is made up of exceedingly fine fusiform or spindle-shaped muscular fibre-cells, with well-defined oval nuclei, among which are interspersed variously shaped nuclei, the germs of future fibres. As pregnancy advances these fibres are considerably enlarged, and new ones are produced: some idea of the former may be gathered from the observation of Kölliker, that their length is increased from seven to eleven times, and their width from two to five times. According to the same observer, the formation of nerve-fibres ceases about the six and a half month, and there is no longer any trace of their earlier forms, the germs

FIG. 41.



having all undergone the developmental process. The general arrangement of the muscular fibres is more or less lamellar, and though authorities are much divided in opinion as to the exact arrangement of the several layers, it seems on the whole probable that they form first an external or longitudinal layer (Fig. 42), and secondly, an internal or circular layer (Fig. 43). It must be understood, however, that it is only in the most general terms that this arrangement can be said to exist, and it will be found that the fibres of one layer are variously interlaced with those of the other. Even as regards the so-called external or longitudinal layer, it will be seen that they also run transversely, coming in fact from the broad and round ligaments, and expanding over the anterior and posterior aspects of the organ, and in between them all run the large and numerous bloodvessels. Upon the outer surface the tendency of the fibres is to converge towards the angles to which the appendages are attached, while internally an apparent disposition to the formation of concentric circles round the orifices of the Fallopian tubes, and also round the cervix, has been observed. Between the internal and external layers there are masses of fibres interlacing in all directions, and making up, in fact, the bulk of the organ. According to Dr. Farre, there is no uniformity in the arrangement of these fibres. "Nothing like a continuous arrangement of muscular fibres in the form of circular or longitudinal bands, surrounding or investing the organ, can anywhere be demonstrated by the aid of the microscope."

FIG. 42.

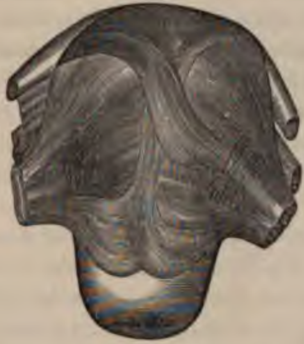
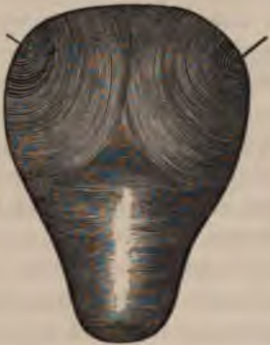


FIG. 43.



The disposition of the bloodvessels is peculiar; they are considerably increased both in length and diameter, and, according to Kölliker and Siebold, the inner and outer coats of the veins are so changed by the formation in them of muscular fibre-cells, that there is little difference observable between them and the middle or muscular coat, except that in the former the fibres are arranged longitudinally, in the latter circularly. An exception to this rule exists in the veins near where the placenta is attached; these still retain but their one layer of muscular fibre. The arteries of the uterus take a spiral or convoluted course into its substance. The veins exist as flat canals without valves: both are much more numerous and larger in the placental region.

The nerves of the uterus are derived chiefly from the inferior aortic and hypogastric plexuses; but a few twigs are also sent from the sacral plexus, and nearly all are of the ganglionic or gelatinous variety, with just a few of the ordinary cerebro-spinal form.

With regard to the development of the nervous structures of the gravid uterus, Dr. R. Lee affirms that these increase in size equally with the other tissues; while other observers, following the opinions of both the Hunters, declare that it is the neurilemma only and not the nerve-tubules which are thus enlarged. It is difficult, however, to conceive why that which serves merely to protect and support the nerve-fibre should take on such a developmental change without there being, so far as we know, any necessity for it, unless the observation of M. Kilian be true—namely, that the nerve-tubules in the unimpregnated state are very imperfectly developed, and that during pregnancy, without any increase in size, they assume a higher function by becoming filled with medullary matter, hence the increase of the fibrous sheath is needful to protect its more highly developed contents.

In the earlier weeks of gestation the uterus enlarges somewhat unequally, and its shape varies relatively to the unimpregnated condition; it becomes more spherical and less flattened. This change in shape, however, is shared in by the body of the organ more than by either the cervix or fundus. The former does not begin to expand until quite the later months; and the latter, according to Wagner, does not rise much above the line of the Fallopian tubes till near the second month. This is well seen in the drawing taken by Wagner.

It is not until about the fourth month that the uterus rises well out of the pelvis, and may be felt above the pelvic brim. Every now and then, about this time, syncope is induced, and it has been thought to be due to some sudden change in the position of the uterus, whereby pressure is removed from the larger pelvic vessels; but, though the fact may be admitted, the explanation certainly does not appear to be very trustworthy.

From the fourth month onwards the fundus gradually rises into the abdomen, until, at about the eighth and a half month, when it reaches its highest point and is near to the scrobiculus cordis. After this it recedes again, preparatory to the commencement of labor, and the cervix expands more fully, so that the head comes down close on the os. Much discussion has taken place as to whether the cervix expands, so as to form part of the uterine cavity before labor commences. I have no doubt whatever that it does; but at the same time I believe that this expansion only occurs within the last month, and more especially within the last week or two, as if in preparation for that fuller expansion which is absolutely necessary to enable the child to pass through.

With regard to the *action of the uterus during labor*, this is no doubt partly peristaltic and partly reflex; the former being due to the ganglionic nerves, the latter to the cerebro-spinal; and either probably, but certainly the first, may exist without the other. Cases, for instance, are on record where complete paraplegia has existed, and yet delivery has apparently been accomplished even more rapidly than in the normal condition. Indeed, the uterus has sometimes acted with sufficient vigor *after death* to insure rapid expulsion of its contents.

Immediately after labor the uterus ordinarily contracts firmly to about the size of a fœtal head at term, and may easily be felt through the abdominal parietes. Its tissue is still porous and spongy, and its inner surface covered with a shreddy flocculent membrane, formed by the remains of the deciduous membrane which has been thrown off with the secundines. By many authorities it has been supposed that this surface of the uterus was completely denuded after labor, the muscular tissue being laid bare, and the condition resembling that of a stump after amputation: it has been proved, however, by several observers, that such is not the case, though the layer of mucous membrane left is exceedingly thin until the new one is formed. For the first few days no special change occurs in the organ, but by the end of the first week those processes which are to restore it to its normal unimpregnated condition begin. This is termed *involution*.

The uterus now gradually loses weight, it diminishes in size, its large, coarse, muscular fibres undergo a sort of fatty disintegration, beginning first in the fibres of the inner laminæ, then in the outer, and lastly in the cervical portion, "the fibres lose their sinuous outline, and appear paler; while within them appear yellow oil-granules, commonly arranged in rows." The whole organ under this process softens, is of a dirty yellow color, the molecular fat is gradually absorbed, and in this way it again reaches its former shape and dimensions. Meanwhile its muscular character disappears, it assumes its peculiar white fibrous appearance, and new cells and nuclei are deposited in its meshes; the germs of future development. Simultaneous with the occurrence of these changes in the proper tissue of the uterus, its lining membrane disintegrates and flows away with the *lochia*, while a new lining gradually takes its place. Finally, the new elements are seen first at about the end of one month after parturition, but it is not until the sixtieth or seventieth day after delivery that the uterus has attained its ordinary condition.

When the process of disintegration and absorption has been carried too far, the state of *superinvolution* is produced, the uterus remaining permanently small: this condition is generally productive of sterility and scanty menstruation, or amenorrhœa. Should the process be arrested short of the normal degree, then the condition of *subinvolution* results: this is often attended with profuse leucorrhœa and menorrhagia. The uterine sound will generally detect either condition, but the diagnosis will be further aided by the other symptoms and history.

PART II.

PREGNANCY.

CHAPTER I.

SIGNS AND SYMPTOMS OF PREGNANCY.

IT may perhaps be said, without exaggeration, that there is hardly a branch of obstetric medicine which at times presents greater difficulties or is attended with more important consequences than the *Diagnosis of Pregnancy*. Its non-recognition may not only lead to results disastrous alike to mother and child, but a medical man may by his neglect become the unconscious instrument of a crime from which his moral nature shrinks with horror. On the other hand, in the case of the unmarried, he may, if mistaken in his diagnosis, cast a slur upon a spotless character, and by his dictum destroy a reputation on which the maintenance of life depends.

Little need be said, then, to prove how necessary it is to have a correct appreciation of the various *Signs of Pregnancy;* and hence the eagerness with which men have from time to time endeavored to discover some new and more unfailing sign of this condition. It must be admitted, however, that of late years no great advance has been made in this direction; and though many suggestions, of doubtful value in themselves, have been offered, we still in the main have to trust to a few signs, the value of which has been confirmed by years of experience.

There have been many ways of considering this subject by variously arranging the symptoms under certain classes; but without stopping to discuss their advantages or otherwise, it seems to me that the most natural and convenient method will be to state briefly *what phenomena may be looked for with each succeeding* *month*, instead of considering each separate symptom as it occurs and is modified during the whole course of pregnancy. This arrangement will, I think, be of no small convenience to the student, and, at the same time, it will be easy of reference for the practitioner.

As may be readily imagined, it is in the *early weeks* of pregnancy that the greatest difficulty of forming a correct opinion presents itself. In some cases there is absolutely nothing to excite suspicion of such a condition, and the patient may only become aware of it when pregnancy has far advanced. This is especially apt to occur during lactation, and I have known abortion happen many times under these circumstances, caused probably by the sympathetic relations between the breast and the uterus. In other instances no sooner has conception taken place than, sometimes even within a few hours, symptoms begin which at once attract attention, and force upon the patient's mind a conviction of her situation. Between these two extremes there is every shade of variety, from the smallest, almost inappreciable, change to a general disturbance of nearly every function.

As a general rule, among the *common indications of pregnancy* there are observable certain sympathetic derangements of the nervous system, such as increased irritability or unusual mildness of temper, fretfulness, despondency, headache, toothache, and various other neuralgic affections, with alterations in the tastes and dispositions; often a remarkable loathing of food, with nausea, or an unnatural craving after substances sometimes of a disgusting nature. The digestive system, too, becomes deranged: occasionally there is profuse salivation, or pyrosis, acid eructations, heartburn, vomiting, dyspepsia, diarrhœa, or constipation; the latter caused sometimes by pressure of the uterus on the rectum. Changes are also common in the circulatory system; there is a sense of general plethora, with increased frequency and fulness of the pulse, and, it is said, a much greater proportion of fibrin present in the blood, with flushings of the face and an increase of the temperature of the body. It is possible that this sense of plethora may really be due less to any actual change in the constitution of the blood, than to a kind of reflex paralysis of the bloodvessels, due to an irritation starting from the uterus. At all events, opinions are certainly divided as to the fact of any change in the blood. The change most commonly ascribed is the presence of a buffy coat. Becquerel and Rodier found that the specific gravity both of the serum and of the defibrinated blood itself was diminished, while the fibrin, the water, and the phosphorized fat were all increased; and the corpuscles were diminished. Hence they attached great importance to these blood changes. Simon, on the other hand, found that though the blood presented a buffy coat, "it differs in no respect from normal blood." Sometimes the skin undergoes notable changes; the complexion becomes sallow, florid, or blotchy; cutaneous eruptions, especially of the scaly or papular kind, will occasionally appear, and though defying every kind of treatment during gestation, will disappear immediately after delivery. Sometimes hair in great abundance will grow upon the face and chest, and while some persons get fatter, others lose flesh, and their features assume a peculiar shrunken and sharpened appearance. In persons suffering from phthisis, as well as some other serious organic diseases, the mischief is often arrested during pregnancy.

First Month.—One of the earliest and perhaps most constant signs of pregnancy, that which often occasions the first suspicion in the patient's mind is the cessation of menstruation. So far, however, from its being a proof of pregnancy, it is well known —1st, that it will occasionally stop as a consequence of disease, and especially in cases of ovarian disease; 2d, that pregnancy may exist and menstruation continue (I know of one case where for three pregnancies this happened); and 3d, pregnancy may occur, as during lactation, when menstruation is not being performed, and therefore not arrested by it.

There are a few curious cases on record where menstruation has only occurred during pregnancy and at no other time; Baudelocque mentions several such; and there are others where it has appeared then for the first time. Much discussion has taken place regarding the source of the fluid under these circumstances; some authorities believe that it is secreted from the vessels of the upper part of the vagina; others think that it comes from the cervix uteri; while others, again, think that in the first month or two, at least, it may come from the uterine cavity itself prior to the union of the decidua reflexa with the decidua vera. It should be remembered that when it is desired to conceal the fact of pregnancy the patient will sometimes affirm that she is quite "regular," and will even stain her linen to carry out her deception.

In addition to this sign, some of those sympathetic derangements already mentioned will generally appear; the most constant, perhaps, being morning sickness. Nausea alone would not be a sign of much value, but there are peculiarities about that incidental to pregnancy which stamp it with much greater force. Though mostly occurring in the early morning as soon as the patient gets out of bed, or into the upright position, it may occur at any time of the day, and seems especially induced by the sight of food. It is not like an ordinary sickness, but is accompanied by a peculiar deadened sinking feeling at the pit of the stomach, not unlike that caused by the motion of a vessel at sea, or that never-to-be-forgotten nausea which most who have learned to smoke have experienced. It may occur within a few hours of conception, and may last only a few weeks, or it may continue throughout the whole of pregnancy. Sometimes it lasts only for a few minutes during each day, but I have seen cases where the patient had hardly any freedom from it during the whole twenty-four hours, except while asleep. Sometimes they will even be awoke by it in the night.

Another symptom which is often extremely troublesome and distressing is profuse salivation. I have known cases of this kind where the quantity of fluid which poured from the mouth might be measured almost by pints in the twenty-four hours. If we examine the mouth no indications will be found of inflammation either of the mouth or gums, nor is there any fetor of the breath, or any metallic taste, such as characterize mercurial salivation.

Certain changes in the uterus and vagina also occur; the os and cervix become soft and spongy, "cushiony," the transverse lip-like fissure being changed for a more circular form; the temperature of the vagina is somewhat increased, and there is also a freer secretion of mucus. The changes which take place subsequently in the shape of the os and cervix vary according as the patient is a primiparous or multiparous woman, and these changes are very well represented in Figs. 45 to 50.

In the *Second month*, besides the continuance of the above, about the end of this period, the breasts begin to feel more or less tender and painful, there is a sense of fulness and throbbing in them, and they are observed to be somewhat larger, firmer, and with a peculiar knotty feel; the veins will be seen slightly enlarged, coursing over the breast, and the areolæ round the nipple are of a somewhat darker tint than usual. The degree to which this occurs is determined very much by the number of previous pregnancies, being much more strongly marked in multiparæ than primiparæ; but it is still more marked by the complexion of the patient, dark persons showing it far more than fair. Another change, "equally constant and deserving of particular notice, is a soft and moist state of the integument, which appears raised and in a state of turgescence, giving one the idea that if touched by the point of the finger it would be found emphysematous" (*Montgomery*). The nipple also becomes puffy, swollen, and tender, and around it are seen just rising the granular follicles of a pale rose or flesh color. Milk will also be found secreted, and will generally appear at the nipple on gentle pressure.

All these changes, however, may occur without pregnancy, in certain diseased conditions of the uterus; but there is one mammary sign to which Dr. Lumley Earle, who wrote a very useful little monograph on the *Mammary Signs of Pregnancy*, attached considerable importance—indeed, he regarded it as most certainly indicative of pregnancy—namely, *the presence of sebaceous matter in the follicles* round the nipple. He said that the follicles often enlarge from other causes beside pregnancy, but that they never contain sebaceous matter except in that condition. This sign is especially valuable in the early months of gestation and in multiparæ; while, according to the same authority, "in primiparæ the most important mammary signs during the early months are the presence of milk in the breasts and the raised condition of the areolæ."

With regard to the enlargement of the veins, he thought that when the enlargement is considerable, and especially when they traverse the areola, this sign is quite characteristic of pregnancy. The peculiar white streaks or scars upon the breast which are sometimes seen are also "conclusive evidence of a present or former pregnancy." The presence of milk affords strongly corroborative evidence.

My own experience in regard to the mammary signs of pregnancy leads to the conclusion that, except as corroborative evidence, they are of very little value, and I should never think of affirming the existence of pregnancy from even well-marked instances of any or all the reputed signs. I have seen them often in cases of menstrual irregularity, and especially where there was evidence of ovarian disease, or where much uterine or ovarian irritation existed. I have also seen cases of pregnancy where no mammary signs existed until quite the latter months.

On examining the os the changes before mentioned will be intensified. In primiparæ the os is quite circular and closed. The cervix very soft, somewhat enlarged, thicker, of irregular outline, and more readily reached by the finger. The abdomen becomes somewhat flat, possibly from the sinking of the uterus in the pelvis.

Third Month.—Generally slight enlargement of the abdomen takes place at the end of the third month, not so much from the pressure of the uterus in the abdominal cavity, which as yet cannot be felt out of the pelvis, except rarely in very thin persons, but from the intestines being displaced from that region: hence the enlargement will be regulated according as they are empty or full, or distended with flatus. The changes in the breast have now become much more decided; the areolæ are larger and darker; the cuticle within them soft, moist, somewhat turgid; the glandular follicles, from twelve to twenty in number, are more prominent; the nipple larger and more tender, the veins distended on the surface, with a general mottled appearance; the whole organ evincing great activity, with occasionally slight secretion of milk. The os will now be less easily reached than in the preceding month, and its position has somewhat changed, owing to the fundus having risen so far as to allow the intestines to fall down in the cul-de-sac behind it. The os is consequently inclined towards the hollow of the sacrum, the fundus being thrown forwards on to the bladder and symphysis pubis.

Occasionally, in very thin people, on applying the stethoscope to the abdomen just above the pubis, and pressing firmly down in the direction of the pelvic brim, we may succeed in reaching the fundus uteri and detecting a slight blowing sound caused by the blood rushing through the uterine sinuses: this is the utero-placental sound of Hohl, the *bruit placentaire* of Kergaradec, or the uterine souffle of Naegele. Care is required, however, not to attribute too much importance to this sign, for the same sound may be heard either directly from the aorta or vena cava, or indirectly by being transmitted through any solid body pressing upon those vessels, as in the case of a uterine or ovarian tumor. I have often heard it in both of these conditions, when pregnancy did not exist, and hence some authorities have thought that when it is heard even in pregnancy it is produced, as in the case of tumors unconnected with pregnancy, by pressure of the gravid uterus on the deeper bloodvessels. Naegele, however, held very strongly to the opinion that it is really a uterine sound originating in the uterus itself, and probably, because, as he thought, it is best heard in the groins, produced by the large uterine arteries just where they enter the uterus from the broad ligaments. It is not, however, true that this bruit is always heard best in, or just above, the groins; in this respect it varies greatly in different cases; and on the whole, it certainly seems likely that the sign in question is produced by the rush of blood through the vessels of the placenta and contiguous part of the uterus.

In the *Fourth month*, all the symptoms above mentioned remain, namely, suppresion of the menses, changes in the breasts, certain sympathetic derangements, which generally now begin to subside, and enlargement of the abdomen, which becomes more strongly marked. It will now be found that the uterus has risen about two inches above the pubis, and may be felt there as a hard, solid, round mass as large as a cricket-ball; per vaginam, we learn that the uterus is enlarged, and that the anterior wall is becoming rounded. The mother now feels for the first time a slight movement within, which is described sometimes as a sort of feeble fluttering, and is sometimes attended by other peculiar sensations of a sympathetic character: to this sensation the term "quickening" is given. The uterine souffle is now tolerably distinct, though sometimes it requires great tact and acumen to detect it. Another auscultatory sign can sometimes be detected at this period, namely, the pulsations of the fœtal heart, which produce a sort of tic-tac sound with a frequency of about 130 to 150 per minute; it is not synchronous with the maternal pulse, and differs in every respect from the sound previously described; it is most frequently heard a little to the right or left of the middle line, about midway between the fundus and symphysis pubis; but it is also heard at the fundus, sometimes in the lumbar region, and sometimes close to the umbilicus; in short, the point of greatest audibleness varies probably with the position of the child, and it seems likely that the sound is communicated most readily when the stethoscope happens to be applied either over the back or head of the child. When once clearly made out, which is not usual so early as this month, there is no longer any room for doubting the existence of pregnancy; it is proof positive.

It should be borne in mind, however, that there may be a living fœtus in utero, even though we fail to discover the pulsations of its heart; for the sound may be obscured by an excess of liquor amnii, or the child may be very feeble, and its heart-sounds weak, or the position of the child in utero may be such as to hinder the transmission of the sounds to the external wall.

Besides this, the sound caused by the movements of the fœtus may sometimes at this period be heard through the stethoscope; and lastly, M. Jacquemier has noticed a peculiar dusky color of the vagina as common during the fourth month.

Fifth Month.—To all of the above, each of which has now become more intensified and clear, another new sign shows itself at this period; it is but feeble at present, but still is generally distinct. I allude to *ballottement.* If the patient be placed in an upright position, the finger introduced into the vagina and pushed suddenly against the uterus, striking it between the os and symphysis pubis, we shall receive the impression of something having bounded away from the finger; and by keeping the finger still upon the same spot, we shall in a few seconds perceive something falling upon it again—in fact, we had thrust away the fœtus from its resting-place, and by its own gravity it fell again upon the spot touched. This is a sign which, when clearly made out, is quite infallible; there is no other condition which could by any possibility give rise to it. All the auscultatory signs are now pretty evident. Movements are also plainly felt by the mother, and occasionally by the hand of the practitioner placed over the abdomen. The abdominal enlargement is quite visible, the fundus having risen to about midway between the pubis and umbilicus. The cervix begins to shorten, or rather, according to more recent observations, which, however, are not original, but only a confirmation of opinions expressed long since by Stoltz and Cazeaux, the cervix by pressure from above *appears* to be shortened, but is really only increased in its lateral diameter without any appreciable diminution of the length from above downwards. This I have myself verified again and again. The symptoms previously mentioned remain.

Sixth Month.—The fundus by this time has reached the level of the umbilicus, the abdomen protruding in an equal degree; the uterine souffle may be plainly heard, especially at a spot on either side and a little above the groin. The sounds of the fœtal heart may also be detected without much difficulty, ballottement and the fœtal movements are quite distinct, and the condition of the breast is unmistakable. The other minor signs now diminish in value from the stronger evidence afforded by those just mentioned.

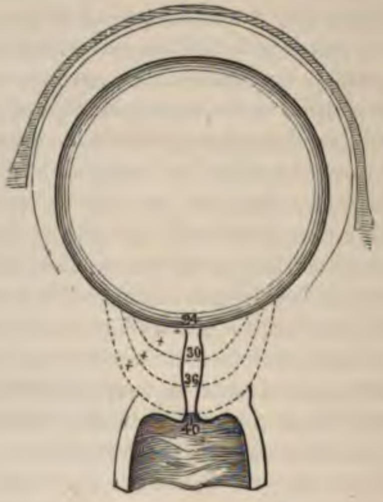
Seventh Month.—The maternal umbilical depression has almost disappeared, from the pressure of the uterus, and consequent distension of the abdominal wall; the fundus is situate about two inches above this spot. The vaginal portion of the cervix *appears* about half its length. This is caused by its being drawn up higher into the pelvic cavity beyond reach of the finger, but is not really due to any shortening. Dr. Taylor, Professor of Obstetrics in America, denies that the cervix ever shortens, or becomes obliterated, during pregnancy. On the contrary, he says that it is often elongated. From numerous investigations which he has made during life, at various periods of pregnancy, at full term, during the first days of labor, and at post-mortem examinations, he is satisfied that the cervix uteri does not undergo any shortening or expansion of the supra or infra vaginal portion, but retains its whole length, and only becomes expanded or dilated at the commencement of labor, the cervix serving as an intermediate channel, or canal, between the body of the uterus and the vagina: this dilatation is effected through the combined operation of the softened condition of the neck, and by the pressure of the liquor amnii and the descent of the child's head or body, the internal os being the first to yield. The os is close against the hollow of the sacrum, ballottement is very distinct; and all the other symptoms remain in equal or even greater force.

Eighth Month.—There can now be little or no difficulty in determining the fact of pregnancy. The abdomen is very much distended, more or less pyriform in shape; the umbilical depression has disappeared. The fundus uteri reaches midway between the umbilicus and the scrobiculus cordis. The head of the child can generally be felt per vaginam; the cervix is almost entirely withdrawn into the abdomen, although its length can be felt scarcely, if at all, diminished. The os is reached with difficulty; the vagina is very moist, and has a dark congested appearance. The breasts are large and hard, the areolæ dark, the follicles prominent, and milk is sometimes abundant; the uterine souffle can be heard in almost every part of the abdomen; the fœtal pulsations are much louder than before, and the movements of the child can easily be felt by the hand on the abdomen, sometimes even by the mother to a painful degree; ballottement is very distinct.

Ninth Month.—The cervix uteri has now entirely disappeared, and the fundus has reached the level of the scrobiculus cordis; the movements of the fœtus will be plainly felt by the hand placed on the abdomen, and the auscultatory signs can readily be heard; the other symptoms remain much the same.

In Fig. 44, which I have taken from Schultz's plates, we have diagrammatically represented the changes which take place in the shape of the uterus in the successive months of pregnancy, and it is there seen how the cervix is affected by the growth and expansion of the uterus over its contents. The numbers in the diagram refer to the several weeks of utero-gestation, and the dotted lines represent the absorption of the cervix by the growth of the uterine contents at these several periods of pregnancy.

Fig. 44.



Tenth Month.—In this, the last month of gestation, an enumeration of the signs of pregnancy would include most or all of the following,—absence of menstruation; enlargement of the breasts, and other mammary changes detailed above; abdominal swelling, and the presence of a firm, ovoid mass filling its cavity. Palpation plainly discovers fœtal movements within the swelling, and auscultation reveals two, three, and occasionally four distinct sounds,—the uterine souffle, the fœtal heart, the funic sound, heard only when the cord is wound round the body of the child, and sounds produced by movements of the fœtus. The os is directed towards the upper part of the sacrum, and exists as a small circular depression; the cervix has disappeared as a canal, but is spread out over the presenting part of the child. The globular head of the child may be felt filling the upper part of the vagina, but ballottement cannot be practiced in consequence of the child filling the uterine cavity, and there being little liquor amnii; the vagina is deeply congested, and of a dark livid hue.

Before concluding the subject of the signs of pregnancy as revealed more especially by digital examination, reference may be made to the annexed series of illustrations, Figs. 45 to 50, which are intended to represent not only the successive changes in the os and cervix which take place in successive periods of pregnancy, but also the differences observable in the case of primiparous and multiparous women. Thus Fig. 45 represents the cervix uteri at about the sixth month of utero-gestation, where it is seen that

FIG. 45.

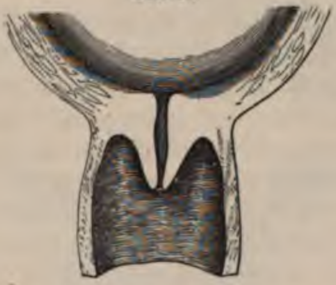
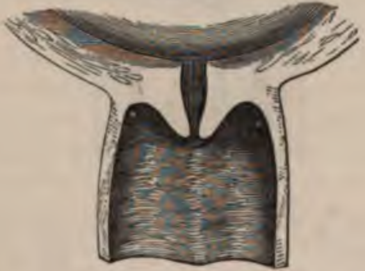
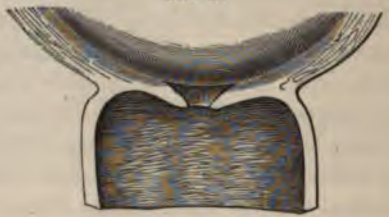


FIG. 46.



little or no absorption of that part has occurred. Fig. 46 represents the state of the parts about six weeks later, in which absorption of the cervix is distinctly evident, while in Fig. 47 the cervix has entirely disappeared, being expanded over the uterine contents. All these three diagrams refer to the state of the cervix in the case of primiparous women.

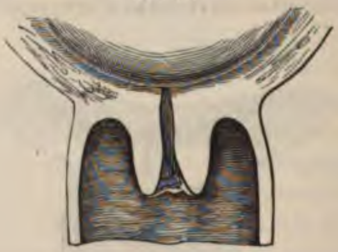
FIG. 47.



On the other hand, Figs. 48, 49, 50, represent the same periods of pregnancy in multiparous women, wherein it is seen that the cervix is much more irregular in shape, is never so completely closed at its lower orifice, and is altogether thicker, coarser, as it were, looser, and shows evidence of previous damage or change which is not observable in the primiparous woman.

This sketch of the signs of pregnancy would not be complete, however, without allusion to one other, which, though of very doubtful value, has nevertheless attracted the attention of practitioners; I mean a peculiar condition of the urine due to the presence of *kiesteine*. M. Nauche says: "By allowing the urine to stand for some time, in thirty or forty hours a deposit takes place of white, flaky, pulverulent, grumous matter, being the casein or peculiar principle of the milk found in the breasts

FIG. 48.



during gestation." The deposit forms sometimes as a delicate cloud in the centre of the urine, which then rises as a pellicle to the surface, and under the microscope numerous infusorial germs are seen; it may occur very early in pregnancy, even so soon as the second or third week. Recent observation, however, shows that this sign cannot be relied upon; for it has been proved that kiesteine is not peculiar to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge from the breasts. Of the nature and character of this substance, Dr. Parkes writes: "It was supposed that this substance was in part composed of casein derived from the mammary gland; but this does not appear to be the case. The so-called kiesteine is not of constant or determined composition, but consists of urea, bladder mucus, fat, infusorial and fungous growths, mixed with the organic matter of the vaginal discharges. Very similar appearances are found less frequently in the urine of anæmic non-pregnant women, and sometimes in the urine of men."

FIG. 49.

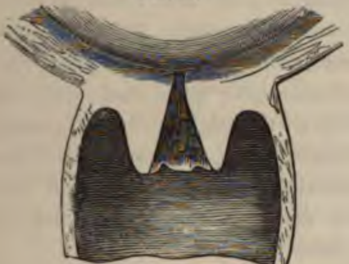
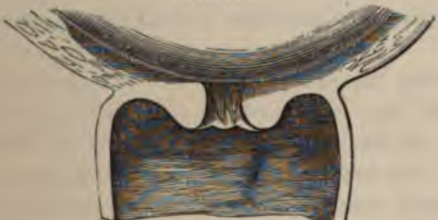


FIG. 50.



Formerly, the *dusky hue of the vagina*, due to an impediment to the return of the venous blood from the mucous membrane, used to be regarded as a sign of doubtful import. I have, however, classed it with the more certain signs, since, in my experience, it has been fully as constant as many of those. Other signs have been mentioned, such as a diminution of the blood-globules, the formation of the buffy coat, an increase in the amount of fibrin, and a diminution of the quantity of albumen in the blood. A peculiar musty smell, something resembling that of the spermatic fluid or liquor amnii, has been noticed by Dr. Pollender as of constant occurrence, and is discoverable, he says, sometimes as early as the eighth day of gestation. The moral and physical changes must also be remembered, together with other peculiar alterations in the functions of the nervous system. These sympathetic derangements may assume almost any form, and need not be described here.

There is yet one other sign which has been observed, and it is one which when clearly made out is of considerable importance: if the hand is placed over the uterus and a little firm pressure is made, it will frequently be observed that the tumor becomes alternately lax and firm; this is due to slight contraction on the part of the uterus, and it is so peculiar and distinctive that I know of no other condition that is at all capable of yielding such a result.

In estimating the relative value of these several signs, there are four which may be considered as of prime importance; and undoubtedly the first place must be given to the detection of the pulsations of the fœtal heart, and the fœtal movements; if these are once clearly made out, the diagnosis becomes certain: the other two are, first, the perception by the finger, *per vaginam*, of the fœtal head, *ballottement;* and secondly, the movements of the fœtus through the abdominal wall. The contractions of the uterus just referred to are of scarcely less value, and next to this are the mammary changes: then come the changes in the os and cervix; then the uterine souffle, the vaginal discoloration, etc., etc.

In the early months of gestation, diagnosis, even at the best, is at all times difficult. It may be rendered doubly so by the presence of disease in some of the abdominal or pelvic viscera; or by simulation through over-anxiety on the part of the patient to be in such a condition; or, on the contrary, by misrepresentation, from a desire, through shame, to hide the existing state of things. Of each of these three conditions there are numerous cases on record.

Before quitting the subject of the diagnosis of pregnancy, a few words may be said on the *signs of plural gestation*, uncertain and consequently unsatisfactory as those signs usually are. Those upon which the greatest reliance is placed, are the disproportionate size of the abdomen compared with the period of gestation; this may also be accounted for by an excess of liquor amnii, by an unusually large child, or by the coexistence of some morbid condition, such as ascites, ovarian dropsy, or other abdominal tumor. The flattened state of the abdomen in front, with the appearance of being divided into halves, is also given as a sign of twins; the inequality of the abdominal surface, the tumultuous movements of the fœtus, the inordinate weight and distension, and the excessive œdema of the lower extremities—any or all of these are spoken of as more or less valuable indications of plural gestation; but many of them are extremely fanciful, and are probably much more the result of imagination than of actual observation. The only really certain, or at all reliable, sign is derived from auscultation; and if, after a very careful examination, we can detect two distinct fœtal pulsations at different points of the uterine surface, with perhaps a different rhythm or non-synchronous action, we may be quite certain of the case without any help from the above.

CHAPTER II.

DURATION OF PREGNANCY.

THE duration of pregnancy is a matter often of considerable moment to the obstetrician, and a question of great interest in its medico-legal relations. Unfortunately, it is one of those about which medical men entertain very different opinions; and this was never more plainly seen than in the celebrated and ever to be quoted case of the Gardner Peerage, where it was contended on behalf of the plaintiff, who sought the peerage of which he had been deprived, that gestation might be prolonged to 311 days, though the ordinary time was nine calendar months and a week, or ten lunar months, or forty weeks, or 280 days. This period was held to be inviolable by Sir Charles Clarke, Drs. Gooch, Davis, and others; while Drs. Blundell, Granville, and Conquest affirmed, on the other hand, that this period, though most commonly correct, was occasionally exceeded.

The period given above has been fixed partly by the average results of a large number of cases, and partly by the evidence of a few exceptional cases which have been recorded, in which impregnation has followed a single coitus, and where consequently the duration of pregnancy could be very definitely determined, assuming that the delivery was accomplished exactly at the completion of the full term. For instance, a lady was visited by her husband, who had engagements away from home, on a certain day; he left her the day following; she quickened 140 days afterwards and was delivered exactly on the 280th day after the visit in question. Now, although these facts appear to be, so far as they go, conclusive, yet it must be borne in mind that they afford no really positive evidence beyond the fact of the date of conception, or at least of coitus, which is a different matter, and the date of quickening and delivery; but they do not tell us for certain that the child was at full maturity at the latter date, though it may have been so to all appearances.

In reference to this question, the late Drs. Reid and Montgomerie collected together thirty-nine and fifty-six cases respectively, in all of which pregnancy occurred after a single sexual intercourse, and the following table gives the result as regards delivery.

Duration.	Reid.	Montgomerie.	Total.
36 weeks, or 252 days.	0	1	1
37 " " 259 "	1	2	3
38 " " 266 "	6	2	8
39 " " 273 "	7	10	17
40 " " 280 "	18	22	40
41 " " 287 "	2	9	11
42 " " 294 "	3	8	11
43 " " 301 "	2	2	4
	39	56	95

But further in addition to the above, there are several cases recorded, where delivery of apparently fully developed children occurred as early as 260 and as late as 284 days after a single coitus, so that the question still remains, and probably will ever remain, very unsettled. Most obstetricians, however, allow that the period of 280 days may, in certain rare instances, be exceeded by at least several days; while, on the other hand, the fœtus may sometimes arrive at maturity at a period short of the time specified. There is, moroever, generally great difficulty in fixing the exact *date of conception*, and of course also the term of gestation. We should always be careful to distinguish between the period of sexual congress and the date of conception: they are by no means necessarily or certainly coincident; and it is the latter, and not the former, which is the true date whence the duration of pregnancy ought to be reckoned. This uncertainty as to when conception follows connection in any given case is that which doubtless gives rise to much of the apparent discrepancy in the term of gestation. In rare and exceptional cases the patient herself has been able to tell by peculiar sensations the exact moment at which impregnation was effected. But it is manifest that conception may or may not follow quickly on connection. In some cases the spermatic fluid may come almost immediately into contact with the ovum, and impregnate it; in others it may travel along the Fallopian tube, and, retaining its vitality, remain perhaps several days before it meets the ovum to fertilize it.

In regard to the question of the possible duration of pregnancy, the following table, compiled by Sir James Simpson, gives, as will be seen, the results of a total of 782 cases, collected by three different authorities: from these it appears that pregnancy may extend to a considerable period beyond that usually assigned, viz., 280 days; for in no less than 355 cases out of 782 this period was exceeded:

Date of Delivery calculated from the Last Day of the Menses.

Weeks.	Days.	Merriman.	Murphy.	Reid.	Total.
37	From 252 to 259	. . .	12	23	38
38	" 260 to 265	13	14	48	75
39	" 267 to 273	14	27	81	122
40	" 274 to 280	33	28	131	192
41	" 281 to 287	22	39	112	173
42	" 288 to 294	15	21	63	99
43	" 295 to 301	10	25	28	63
44 and upwards	" 302 to 326	4	2	14	20
		114	168	500	782

In addition to these, Sir James Simpson himself records four cases in which the ordinary allotted term was greatly exceeded. Thus, deducting twenty-three days from the last appearance of the catamenia, delivery occurred in one case on the 296th day; in another, on the 301st day; in another, on the 309th day; and in another, on the 313th day. But further, Professor Meigs, of Philadelphia, has recorded one case in which he believed pregnancy lasted 420 days; and Professor Atlee two cases, in one of which gestation was prolonged to exactly *one year;* and in the other to *one year and a week.* Lastly, Dr. Murphy relates a case in which pregnancy was prolonged to 357 days, the patient having been taken in labor at the usual time, but, owing apparently to a shock, the uterine action ceased, and did not return till the time specified. I have myself recorded in the sixth volume of the *Obstetrical Transactions* a case in which gestation was similarly prolonged to 320 days. This patient was taken in labor at the end of the ninth calendar month; her medical attendant remained with her some time, uterine action continued with tolerable regularity for several hours, and there was a discharge of liquor amnii; gradually, however, the pains ceased, and finally stopped, and the labor did not come on again till a month afterwards.

Turning now to the other side of the question, it may be well to state *what is the shortest time within which a child may be born alive, and have a fair chance of life.* Under ordinary circumstances, probably 230 to 250 days is the date within which we should consider that a child is fairly viable; but this is only in reference to cases in which the induction of labor is contemplated. There are, however, many cases on record where children have been born alive and brought up at very much younger ages than this; one such is reported in the *Lancet* for 1841, in which a child was born at 171 days, lived four months, and died of measles; and there are many similar cases, but attended with happier results, where utero-gestation had gone on for 190 to 220 days. The following table, by Dr. Montgomerie, is of interest in regard to this question:

No.	Last Menses.	Date of Conception.	Birth.	Duration of Gestation.	Days.	Survival of Child.
				M. D.		
1	Oct. 9.	Oct. 9.	April 3.	5 10	161	Twelve hours.
2	. . . . .	Aug. 24, Married.	March 3.	5 21	174	A week.
3	. . . . .	July 22, Married.	Jan. 18.	5 27	180	131 days.
4	. . . . .	. . . . .	. . . . . .	6 ...	183	Seven weeks.
5	April 10	April 10	Oct. 16.	6 9	189	Eleven years.
6	. . . . .	April 1.	Oct. 10.	6 13	193	Doing well 6 mos. afterwards.
7	. . . . .	Jan. 31.	Aug. 14.	6 16	196	Thirty years.
8	. . . . .	June 12.	Dec. 27.	6 18	198	Two years.
9	. . . . .	Oct. 24.	May 10.	6 19	199	Eleven days.
10	. . . . .	Aug. 22.	March 18.	6 21	201	Thirteen years.

It appears from this table that a child has a very good chanc of life one month at least earlier than the time I have give above, so that in cases of severe pelvic distortion it is not onl justifiable to resort to the induction of premature labor as earl as the twenty-seventh week, thirteen weeks before the full term of utero-gestation, but that the child has even then a good chance of life.

In estimating the probable date of the completion of utero-gestation, and so of determining the period when the labor may reasonably be expected, reference should be made to the following facts.

There is no doubt that menstruation and the maturation and discharge of ova are very intimately related; it is more than probable that the former is an immediate result of the latter, brought about by reflex irritation; hence the generally received opinion, which a reference to statistics confirms, that conception is much more likely to happen shortly before or after the menstrual period—the period of the discharge of ova—than during the intervening weeks, when the ova have escaped or died.

The following facts, which I have often noticed, are worth remembering in fixing the time when the labor may probably be expected. If conception take place *immediately before* the occurrence of menstruation, it will generally be found that the catamenial discharge will not be quite arrested, but it will be very sensibly diminished, and perhaps may only appear for a few hours. On the other hand, if conception has occurred *very shortly after* menstruation, changes take place in the uterus before the next catamenial period, the result of which is that no flow whatever is observed. These are general rules which may serve to indicate roughly the time at which gestation began, and by adding to that 280 days, we arrive at the time at which it is likely to end. For instance, if a person whose menstrual period usually extends over five or six days finds herself pregnant, and remembers that the last menstrual act only lasted one or two days, I should date her pregnancy *from a few days before that period;* but if she states that the last menstruation was performed as usual and that none has appeared since, then I should date her pregnancy at *a week, or fortnight at most, after the last menstrual act.* In the former case, conception probably immediately preceded the last menstruation; in the latter it followed it.

By some authorities the period of quickening is taken as affording evidence of the duration of pregnancy, it being assumed that this period is generally about the middle term of utero-gestation. But this is a very uncertain mode of calculation; partly because it would appear that in some cases fœtal movements either do not take place so soon as in others, or else are so very feeble as to be indistinguishable; and partly because the patients themselves, especially primiparæ, being ignorant of the first sensation, take no notice of it till it is forcibly impressed upon them. At the same time, this method of calculation does undoubtedly possess a certain value, and accordingly Dr. Ryan framed an obstetric calendar, in order to facilitate reference to the probable date of delivery, assuming that the term of utero-gestation was 280 days. The table in question is subjoined to the end of this chapter, and is to be understood thus: for every month in the year there are three columns of figures; the first is the day of the month; the second is the assumed date of quickening, or the middle term of pregnancy, reckoned from such day, and being 140 days from the day of the month in the first column; the third indicates the probable date of delivery, and is 280 days from the supposed date of conception.

Attempts have been made to determine the duration of pregnancy by ascertaining the *cause or causes of parturition.* Some have followed Harvey in the assumption that labor always begins "the very day on which the catamenia would have appeared had impregnation not taken place," and Dr. Tyler Smith has elaborated this theory into something very definite. He, making use of the discoveries of Marshall Hall, believed that the ovarian irritation occurring at what would be a menstrual period, is transmitted to the spinal cord along the ovarian or *excitor* nerves, a reflex influence is thence conveyed by the uterine or *motor* nerves, and this influence is such that the uterus is excited to contraction, and eventually succeeds in expelling its contents. He further alleges that at every preceding monthly period the same tendency to discharge the fœtus exists, but is resisted in the healthy condition of things. On looking closer into the question, however, it will be evident that this theory leaves matters very much as they were before, for it fails to explain why expulsion takes place at the tenth month, and not at any preceding; and it makes use of reasons which, without reference to the reflex theory, are of themselves almost sufficient to account for the phenomena: for instance, it assumes a greater aptitude for contraction in the uterus itself, and an increased readiness on the part of the placenta and membranes to be thrown off.

Sir James Simpson urged that the real cause of parturition is the disintegration and consequent separation of the membranes; and that this process is exactly repeated, only in a somewhat rougher manner, when premature labor is induced by separating the membranes. Dr. Farre is evidently of the same opinion, when he says that parturition is induced by the degenerating metamorphosis of the materials which bind the placenta and consequently the fœtus to the uterus. The same change also takes place in the decidua until the strength of the adhesion gradually diminishing, "it only remains for the contractile power of the uterus to be evoked, in order to accomplish the separation of the fœtus and placenta, like ripe fruit detached from the parent bough."

Lastly, Dr. Charles Clay believes that the duration of pregnancy is determined by the ages of the parents, and "that the younger the parties concerned the shorter the time of utero-gestation; and *vice versâ*, as age increases the term of gestation is proportionably lengthened."

The following table will, I think, be found useful, as a kind of ready reckoner, in estimating the probable date of delivery in any given case. Two hundred and eighty days, forty weeks, ten lunar months, or nine calendar months and a week, are here estimated as the ordinary duration of pregnancy in the human subject. In using this table, as I have said, conception is supposed to have occurred on the day named in the first column, quickening on that in the middle column, being about the middle of the ordinary term of pregnancy, and delivery may be anticipated at or about the date fixed in the third column. Of course, it may vary within two or three days; but if carefully calculated, that is probably the limit:

Table for Estimating the Probable Duration of Pregnancy.

JANUARY.			FEBRUARY.			MARCH.		
Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.
Jan. 1	May 20	Oct. 8	Feb. 1	June 20	Nov. 8	Mar. 1	July 18	Dec. 6
" 2	" 21	" 9	" 2	" 21	" 9	" 2	" 19	" 7
" 3	" 22	" 10	" 3	" 22	" 10	" 3	" 20	" 8
" 4	" 23	" 11	" 4	" 23	" 11	" 4	" 21	" 9
" 5	" 24	" 12	" 5	" 24	" 12	" 5	" 22	" 10
" 6	" 25	" 13	" 6	" 25	" 13	" 6	" 23	" 11
" 7	" 26	" 14	" 7	" 26	" 14	" 7	" 24	" 12
" 8	" 27	" 15	" 8	" 27	" 15	" 8	" 25	" 13
" 9	" 28	" 16	" 9	" 28	" 16	" 9	" 26	" 14
" 10	" 29	" 17	" 10	" 29	" 17	" 10	" 27	" 15
" 11	" 30	" 18	" 11	" 30	" 18	" 11	" 28	" 16
" 12	" 31	" 19	" 12	July 1	" 19	" 12	" 29	" 17
" 13	June 1	" 20	" 13	" 2	" 20	" 13	" 30	" 18
" 14	" 2	" 21	" 14	" 3	" 21	" 14	" 31	" 19
" 15	" 3	" 22	" 15	" 4	" 22	" 15	Aug. 1	" 20
" 16	" 4	" 23	" 16	" 5	" 23	" 16	" 2	" 21
" 17	" 5	" 24	" 17	" 6	" 24	" 17	" 3	" 22
" 18	" 6	" 25	" 18	" 7	" 25	" 18	" 4	" 23
" 19	" 7	" 26	" 19	" 8	" 26	" 19	" 5	" 24
" 20	" 8	" 27	" 20	" 9	" 27	" 20	" 6	" 25
" 21	" 9	" 28	" 21	" 10	" 28	" 21	" 7	" 26
" 22	" 10	" 29	" 22	" 11	" 29	" 22	" 8	" 27
" 23	" 11	" 30	" 23	" 12	" 30	" 23	" 9	" 28
" 24	" 12	" 31	" 24	" 13	Dec. 1	" 24	" 10	" 29
" 25	" 13	Nov. 1	" 25	" 14	" 2	" 25	" 11	" 30
" 26	" 14	" 2	" 26	" 15	" 3	" 26	" 12	" 31
" 27	" 15	" 3	" 27	" 16	" 4	" 27	" 13	Jan. 1
" 28	" 16	" 4	" 28	" 17	" 5	" 28	" 14	" 2
" 29	" 17	" 5				" 29	" 15	" 3
" 30	" 18	" 6				" 30	" 16	" 4
" 31	" 19	" 7				" 31	" 17	" 5

Probable Duration of Pregnancy—continued.

APRIL.			MAY.			JUNE.		
Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.
April 1	Aug. 18	Jan. 6	May 1	Sept. 17	Feb. 5	June 1	Oct. 18	Mar. 8
“ 2	“ 19	“ 7	“ 2	“ 18	“ 6	“ 2	“ 19	“ 9
“ 3	“ 20	“ 8	“ 3	“ 19	“ 7	“ 3	“ 20	“ 10
“ 4	“ 21	“ 9	“ 4	“ 20	“ 8	“ 4	“ 21	“ 11
“ 5	“ 22	“ 10	“ 5	“ 21	“ 9	“ 5	“ 22	“ 12
“ 6	“ 23	“ 11	“ 6	“ 22	“ 10	“ 6	“ 23	“ 13
“ 7	“ 24	“ 12	“ 7	“ 23	“ 11	“ 7	“ 24	“ 14
“ 8	“ 25	“ 13	“ 8	“ 24	“ 12	“ 8	“ 25	“ 15
“ 9	“ 26	“ 14	“ 9	“ 25	“ 13	“ 9	“ 26	“ 16
“ 10	“ 27	“ 15	“ 10	“ 26	“ 14	“ 10	“ 27	“ 17
“ 11	“ 28	“ 16	“ 11	“ 27	“ 15	“ 11	“ 28	“ 18
“ 12	“ 29	“ 17	“ 12	“ 28	“ 16	“ 12	“ 29	“ 19
“ 13	“ 30	“ 18	“ 13	“ 29	“ 17	“ 13	“ 30	“ 20
“ 14	“ 31	“ 19	“ 14	“ 30	“ 18	“ 14	“ 31	“ 21
“ 15	Sept. 1	“ 20	“ 15	Oct. 1	“ 19	“ 15	Nov. 1	“ 22
“ 16	“ 2	“ 21	“ 16	“ 2	“ 20	“ 16	“ 2	“ 23
“ 17	“ 3	“ 22	“ 17	“ 3	“ 21	“ 17	“ 3	“ 24
“ 18	“ 4	“ 23	“ 18	“ 4	“ 22	“ 18	“ 4	“ 25
“ 19	“ 5	“ 24	“ 19	“ 5	“ 23	“ 19	“ 5	“ 26
“ 20	“ 6	“ 25	“ 20	“ 6	“ 24	“ 20	“ 6	“ 27
“ 21	“ 7	“ 26	“ 21	“ 7	“ 25	“ 21	“ 7	“ 28
“ 22	“ 8	“ 27	“ 22	“ 8	“ 26	“ 22	“ 8	“ 29
“ 23	“ 9	“ 28	“ 23	“ 9	“ 27	“ 23	“ 9	“ 30
“ 24	“ 10	“ 29	“ 24	“ 10	“ 28	“ 24	“ 10	“ 31
“ 25	“ 11	“ 30	“ 25	“ 11	Mar. 1	“ 25	“ 11	April 1
“ 26	“ 12	“ 31	“ 26	“ 12	“ 2	“ 26	“ 12	“ 2
“ 27	“ 13	Feb 1	“ 27	“ 13	“ 3	“ 27	“ 13	“ 3
“ 28	“ 14	“ 2	“ 28	“ 14	“ 4	“ 28	“ 14	“ 4
“ 29	“ 15	“ 3	“ 29	“ 15	“ 5	“ 29	“ 15	“ 5
“ 30	“ 16	“ 4	“ 30	“ 16	“ 6	“ 30	“ 16	“ 6
			“ 31	“ 17	“ 7			

Probable Duration of Pregnancy—continued.

JULY.		AUGUST.			SEPTEMBER.		
Quickening.	Labor.	Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.
Nov. 17	April 7	Aug. 1	Dec. 18	May 8	Sept. 1	Jan. 18	June 8
" 18	" 8	" 2	" 19	" 9	" 2	" 19	" 9
" 19	" 9	" 3	" 20	" 10	" 3	" 20	" 10
" 20	" 10	" 4	" 21	" 11	" 4	" 21	" 11
" 21	" 11	" 5	" 22	" 12	" 5	" 22	" 12
" 22	" 12	" 6	" 23	" 13	" 6	" 23	" 13
" 23	" 13	" 7	" 24	" 14	" 7	" 24	" 14
" 24	" 14	" 8	" 25	" 15	" 8	" 25	" 15
" 25	" 15	" 9	" 26	" 16	" 9	" 26	" 16
" 26	" 16	" 10	" 27	" 17	" 10	" 27	" 17
" 27	" 17	" 11	" 28	" 18	" 11	" 28	" 18
" 28	" 18	" 12	" 29	" 19	" 12	" 29	" 19
" 29	" 19	" 13	" 30	" 20	" 13	" 30	" 20
" 30	" 20	" 14	" 31	" 21	" 14	" 31	" 21
Dec. 1	" 21	" 15	Jan. 1	" 22	" 15	Feb. 1	" 22
" 2	" 22	" 16	" 2	" 23	" 16	" 2	" 23
" 3	" 23	" 17	" 3	" 24	" 17	" 3	" 24
" 4	" 24	" 18	" 4	" 25	" 18	" 4	" 25
" 5	" 25	" 19	" 5	" 26	" 19	" 5	" 26
" 6	" 26	" 20	" 6	" 27	" 20	" 6	" 27
" 7	" 27	" 21	" 7	" 28	" 21	" 7	" 28
" 8	" 28	" 22	" 8	" 29	" 22	" 8	" 29
" 9	" 29	" 23	" 9	" 30	" 23	" 9	" 30
" 10	" 30	" 24	" 10	" 31	" 24	" 10	July 1
" 11	May 1	" 25	" 11	June 1	" 25	" 11	" 2
" 12	" 2	" 26	" 12	" 2	" 26	" 12	" 3
" 13	" 3	" 27	" 13	" 3	" 27	" 13	" 4
" 14	" 4	" 28	" 14	" 4	" 28	" 14	" 5
" 15	" 5	" 29	" 15	" 5	" 29	" 15	" 6
" 16	" 6	" 30	" 16	" 6	" 30	" 16	" 7
" 17	" 7	" 31	" 17	" 7			

Probable Duration of Pregnancy—continued.

OCTOBER.			NOVEMBER.			DECEMBER.		
Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.	Conception.	Quickening.	Labor.
Oct. 1	Feb. 17	July 8	Nov. 1	Mar. 20	Aug. 8	Dec. 1	Apr. 19	Sept. 7
" 2	" 18	" 9	" 2	" 21	" 9	" 2	" 20	" 8
" 3	" 19	" 10	" 3	" 22	" 10	" 3	" 21	" 9
" 4	" 20	" 11	" 4	" 23	" 11	" 4	" 22	" 10
" 5	" 21	" 12	" 5	" 24	" 12	" 5	" 23	" 11
" 6	" 22	" 13	" 6	" 25	" 13	" 6	" 24	" 12
" 7	" 23	" 14	" 7	" 26	" 14	" 7	" 25	" 13
" 8	" 24	" 15	" 8	" 27	" 15	" 8	" 26	" 14
" 9	" 25	" 16	" 9	" 28	" 16	" 9	" 27	" 15
" 10	" 26	" 17	" 10	" 29	" 17	" 10	" 28	" 16
" 11	" 27	" 18	" 11	" 30	" 18	" 11	" 29	" 17
" 12	" 28	" 19	" 12	" 31	" 19	" 12	" 30	" 18
" 13	Mar. 1	" 20	" 13	April 1	" 20	" 13	May 1	" 19
" 14	" 2	" 21	" 14	" 2	" 21	" 14	" 2	" 20
" 15	" 3	" 22	" 15	" 3	" 22	" 15	" 3	" 21
" 16	" 4	" 23	" 16	" 4	" 23	" 16	" 4	" 22
" 17	" 5	" 24	" 17	" 5	" 24	" 17	" 5	" 23
" 18	" 6	" 25	" 18	" 6	" 25	" 18	" 6	" 24
" 19	" 7	" 26	" 19	" 7	" 26	" 19	" 7	" 25
" 20	" 8	" 27	" 20	" 8	" 27	" 20	" 8	" 26
" 21	" 9	" 28	" 21	" 9	" 28	" 21	" 9	" 27
" 22	" 10	" 29	" 22	" 10	" 29	" 22	" 10	" 28
" 23	" 11	" 30	" 23	" 11	" 30	" 23	" 11	" 29
" 24	" 12	" 31	" 24	" 12	" 31	" 24	" 12	" 30
" 25	" 13	Aug. 1	" 25	" 13	Sept. 1	" 25	" 13	Oct. 1
" 26	" 14	" 2	" 26	" 14	" 2	" 26	" 14	" 2
" 27	" 15	" 3	" 27	" 15	" 3	" 27	" 15	" 3
" 28	" 16	" 4	" 28	" 16	" 4	" 28	" 16	" 4
" 29	" 17	" 5	" 29	" 17	" 5	" 29	" 17	" 5
" 30	" 18	" 6	" 30	" 18	" 6	" 30	" 18	" 6
" 31	" 19	" 7				" 31	" 19	" 7

CHAPTER III.

SIGNS OF THE DEATH OF THE FŒTUS IN UTERO.

THE diagnosis of pregnancy is sometimes rendered more than ordinarily difficult by the death of the fœtus in utero. Such an occurrence I have known on many occasions give rise to doubts as to the existence of pregnancy, even in the patient's mind, when previously there had been no doubt on the subject. In certain cases, it may be very important to be able to tell whether the fœtus be really dead or not: we may be required to decide this question as medical jurists; but still more often it comes before us in operative midwifery, as, for instance, in cases of turning, forceps, or craniotomy. If the child were living, we should naturally shrink from attempting the latter operation where there was a chance of performing successfully either of the other two, even at the risk of a little injury to the mother: on the other hand, if the child were known to be dead, we should disregard it altogether, and resort to that which was easiest of performance, and therefore least dangerous to the mother.

Unfortunately, however, we cannot always determine with absolute certainty the question of fœtal life or death, though there are certain symptoms which are usually regarded as indicative of the latter condition: they may be classed under two heads—1, *Those occurring before;* and 2, *Those incidental to, labor.*

Among the symptoms of fœtal death which occur before labor sets in, may be reckoned the following, which are placed in the order of their relative value and frequency. First the patient experiences a sensation of a dead, heavy weight in the lower part of the pelvis, as if the uterus had dropped: together with this there is a sort of damp coldness in the abdomen, accompanied by occasional rigors; there is absence of all auscultatory signs in regard to the fœtus itself, either of movement or pulsation; the movements of the child are not felt by the mother, nor can they be made out by the practitioner; the abdomen becomes flaccid, and loses its firm, elastic, rounded feel; the uterus seems to roll from side to side with the position of the patient; the abdomen also somewhat recedes, so that the umbilicus, which before protruded, is now retracted; if the fœtus be retained long after its death, the abdomen will notably diminish in size, the breasts will become flabby, and the secretion of milk will stop; occasionally there is a thick slimy fetid discharge from the vagina; and with all these symptoms the patient very often feels ill, languid, and depressed; there is loss of appetite, nausea, and fetid breath; the eyes are sunken, and there is a dark rim round them, with other indications of constitutional disturbance; the latter sometimes occur to such an extent that the propriety of inducing premature labor may have to be considered.

It is not, of course, meant that all these symptoms will be met with in every case, but implicit reliance cannot be placed upon any one of them singly; it is only by the concurrence of several that anything like a positive opinion can be given. The period at which pregnancy has advanced will necessarily regulate to some extent both the nature and number of the signs of fœtal death; and it should be borne in mind as tending to invalidate some of the above-mentioned symptoms, that a pregnant woman suffering from prolapsus uteri will often complain of a great sense of weight about the pelvis, just as happens in the case when the fœtus is dead, and yet she will afterwards give birth to a living child. The sensation of coldness may arise from other causes than the death of the fœtus, and there is no reason for supposing that a dead fœtus is really any colder than a live one; rigors may occur from numerous causes; the movements of the child are often suspended for many days, or at least are not experienced by the mother, but they may subsequently be felt, and even when they have not, a live child has been ultimately born. The flaccid condition of the abdomen, and the generally relaxed state of the uterus, as experienced by the mother, and as felt by the hand of the practitioner, may also be met with in persons of relaxed habit, or in those who have borne many children; of course the general health may be impaired by a variety of causes.

On the other hand, if the abdomen really diminishes greatly in size from the absorption of the liquor amnii, and the arrest in the development of the child; if at the same time no evidence of its vitality is derived from auscultation; if also the breasts, which were before firm and contained milk, become very flabby, and no milk is secreted, then the case looks much more suspicious.

Supposing labor to have begun, the signs of fœtal death on which we should chiefly depend for diagnosis have reference only to the child, and they are much more reliable than those of the non-parturient state. The information derived from the use of the stethoscope must, of course, take a foremost rank, provided the examination is made by an experienced and competent observer, though at the full time of gestation we can hardly fail to discover positive evidence from it. The other signs, except two, will vary according to the presentation. These two are: 1. The presence of meconium when the case is *not* a breech presentation; and 2. The escape of thick, slimy, and offensive liquor amnii. Neither of these, however, are very sure signs, nor would their absence be evidence of vitality.

In *head* presentations, if the child be dead, no *caput succedaneum* is formed. This condition is always an indication of life, and can only exist where the circulation is going on; for the swelling in question is simply œdema of the scalp consequent on long-continued pressure and arrested circulation. In the case of a dead child, the scalp is felt to be flabby and soft, the bones are looser, more movable, and overlap one another more than usual, "their edges feel sharp, as if no longer covered by the scalp, and frequently communicate a grating sensation when they rest against each other." At the same time it must be borne in mind that a child which is sickly and badly nourished will also have just this condition about the bones of the head. The *caput succedaneum*, when it appears, is more marked in lingering labors, and hence is more frequent in primiparæ; in quick labors it may not appear at all, there being but little compression, and the circulation, therefore, is not obstructed sufficiently long to cause this dropsical effusion into the cellular tissue.

In *nates presentations* the sphincter ani in a dead child is relaxed and without the power of contraction; in a living child, the reverse obtains.

If the *face presents*, the lips and tongue are felt to be flabby and motionless in the one case; firm, full, and occasionally moving in the other.

In *arm presentations*, if the child be alive, the arm will often swell and turn black, it will retain its proper temperature, and sometimes moves; if dead, on the contrary, there is no swelling, no lividity, no movement, and no warmth. If death has taken place some time previously, the epidermis will be found to drop off.

In *funis cases*, if the child be alive, the cord will be felt firm, turgid, and pulsating; on the other hand, if it be dead, the cord will be found flaccid, empty, and pulseless.

CHAPTER IV.

MOLE PREGNANCY.

UNDER the term "mole" have been included a great variety of substances having no other relation to one another than the fact that they were morbid products expelled from the uterine cavity. Properly speaking, however, as Froriep observes, "every mole is a blighted ovum, which has been the product of conception;" it is important to bear this point in mind. Among the substances which have been misnamed mole are polypoid growths, membranous exudations from the vagina or uterus, coagula in which the coloring matter had been absorbed, calcareous tumors, hardened menstrual secretion, etc.

Regarding a mole, then, as some form of blighted ovum, there are three characters which it may assume:

1. That in which the membranes have become greatly hypertrophied, so as to form a thick fleshy mass, while the ovum itself is found not to be developed in any corresponding degree.

2. Where hæmorrhage has taken place into the placental cells, or between the layers of the decidua, forming what has been called an apoplexy of the ovum.

3. That peculiar diseased condition of the chorion villi to which the term vesicular or hydatiform mole, or hydatiform degeneration of the placenta, has been given.

All these several varieties of blighted ova are either the result of the early death of the embryo, or else they occasion it; and there is this practical point to notice, that when the embryo dies early, and the product is not speedily expelled, it often happens that what remains takes on a very rapid development, so that the uterus becomes much more enlarged than is usual at that particular period of gestation. This occurrence is owing probably to the fact that the structures which are now being developed are of lower organization and less complex form than the normal fœtus; hence at the third month the uterus may appear as large as it should be at the fifth. This, however, only continues for a ort time, for ultimately, if expulsion does not take place, rther development is arrested, absorption follows, and a dimin-tion in size is the result.

The *First* form of mole mentioned above—that, namely, in which the ovular membranes are greatly hypertrophied—is always the result of the death of the embryo, from whatever cause that may have happened. The blood which had been received by the chorion for the support of the embryo being now no longer required for that purpose, is appropriated by the former, and hence arises considerable hypertrophy of its structure.

In the *Second* form, that in which hæmorrhage has occurred either into the placental cells or between the layers of the decidua, giving rise to what is called an *apoplectum ovum*, rupture has probably taken place in some small vessel: in these cases the decidua itself remains perfectly healthy, and the amnion is also seen lining the interior of the mass, but it is raised in a nodulated form by the lobulated masses of placenta which are underneath. This mass may be retained in the uterus a considerable time after all growth has apparently ceased, or it may be expelled very soon after the hæmorrhage has taken place; generally it is not retained longer than the twelfth week. If we carefully examine the mass, we shall find either that the embryo has entirely disappeared; or it may be exceedingly small, showing, if the mass be large, that it had died some time before expulsion; or expulsion may have followed quickly on its death, when it will be seen to bear an average proportion to the size of the mass. It is not usual for this form of mole to grow to any great size. I have one in my possession which measured about four and a half inches in length at the time it was extracted, and this is as large as they usually are.

Dr. Tanner described another kind of mole, the most rarely met with of all, in which little else is seen beyond a degenerate amorphous-looking mass of placental structure, without any clearly defined cavity or embryo. The disease appears to originate in the placental tufts by an infiltration between the villi and a sort of fatty degeneration of the coats of the vessels, extending sometimes into the umbilical arteries; the general appearance resulting from these changes is that of a dirty grayish mass; generally the remains of the umbilical cord will be seen, but no other portion of fœtal structure.

The *Third*, and most important variety of all, is the *hydati-*

form or *vesicular* mole, the former name having been given to it from its supposed hydatid character. It is now, however, known to have no connection whatever with that disease, but to consist essentially in a peculiar transformation of the chorion villi into these vesicular, hydatiform, or cystiform structures, each filled with a serous fluid. It has been thought that they were cysts developed out of the cells of the chorion villi, remaining attached to that tissue, and continually developing new cysts *ad infinitum.* Dr. Graily Hewitt has, however, shown that these vesicles have the same structure as the healthy villi, except that the cells are wider apart, and that a serous fluid fills the vesicle, distending it, and so forming various sizes, from that of a pin's head to a large grape. According to this view, the vesicular mole is no new growth, but only an alteration in the ordinary structure. Dr. Hewitt further believes that the disease consists merely in a degeneration of the normal tissue, and that it is the direct *result* of the death of the embryo, the vitality of the chorion being unaffected by it. Other observers believe, and I myself among the number, that the disease of the chorion villi is the first step in the process, and that the death of the fœtus is not the cause, but the consequence of it. According to this view, the fœtus is destroyed, because by the growth and development of the diseased chorion, the fœtal circulation is at first hindered, and then entirely prevented, death necessarily resulting.

But whatever be the relation of the disease to the death of the fœtus, whether it precedes or follows it, there can be no doubt as to its origin and mode of growth; there is the clearest evidence, from an anatomical study of the morbid product, that it is essentially a chorion structure, and minute examination of it seems to prove that each single cyst is the altered form of a chorion villus; that, instead of remaining a tubule, it has gradually lost this character, and assumed more and more of a cystic or spheroidal form, while at the same time a fluid is secreted, or in some other way poured into its cavity.

Such being its probable mode of formation, it follows that the disease must be of very early origin, and hence is explained the fact that the most careful scrutiny has always hitherto failed in discovering any trace of the fœtus, which must have perished almost at the beginning of its career.

The degree to which this species of mole may be developed is something very remarkable. I have seen now many cases of this kind; in three or four the patient was supposed to have reached about the fifth or sixth month of utero-gestation, though the uterus was considerably larger than is usual at that period, and when expelled the contents were sufficient to fill a very large washhand basin: as Dr. Gooch very happily described it in his work *On Some of the Most Important Diseases Peculiar to Women*, the appearance was "like myriads of little white currants floating in red-currant juice." Some of the "white currants" were, however, the size of very large grapes.

The *Symptoms* of mole pregnancy are sometimes very undefined. For the first month or two, perhaps, nothnig different will be observed from the ordinary signs of pregnancy at that period, but subsequently there are general indications of something being wrong; the patient is out of health, she feels weak and depressed, and sometimes there is a sudden cessation of many sympathetic disorders. There are some of the symptoms of fœtal death present, and an absence of the normal signs of pregnancy. In all the cases of vesicular mole which came under my notice, I failed, after a careful examination, in effecting *ballottement*, or in detecting the fœtal pulse; and in two of the cases I expressed a confident opinion of what proved to be the condition. Hæmorrhage is almost certain to occur, and is proportioned to the extent to which the mole is detached from the uterus; in the vesicular variety it is often very great. Another peculiar feature in this variety of mole pregnancy is this—that the uterus *quickly* attains a very large size: in some cases it will be as large at the fourth month as at the full time of normal pregnancy. Sometimes the hæmorrhage is so excessive that forcible extraction may be necessary, in order to save the patient. The symptoms of approaching expulsion are those of ordinary abortion, viz., pain, and discharge of blood.

The *Treatment* is the same as for abortion, and must necessarily vary somewhat with the circumstances of each case. In one of the cases of vesicular mole which came under my care, the flooding was so sudden and severe, that in consequence of the undilated condition of the os I was obliged to resort to plugging the vagina; by this means the bleeding was arrested, uterine action came on, the os was dilated, and when a few hours afterwards I removed the plug, a strong pain sufficed to expel the whole mass, and all further hæmorrhage was arrested.

In another case of this kind the symptoms were exceedingly obscure. There had been indications of pregnancy, but these had now subsided, and only enlargement of the abdomen remained, which was clearly due to the uterus containing something which was certainly not a fœtus, either living or dead. Under these circumstances, as the patient was suffering from a constant and considerable drain of blood, which had been going on for upwards of six weeks, I determined to dilate the cervix, and so to explore the uterine cavity, with a view to determine the nature of its contents. The first application of a tent cleared up the diagnosis; for, on its removal, a few small currant-like bodies came away. I accordingly administered ergot freely in successive doses, uterine action was soon established, and, by introducing the hand, I was enabled quickly to empty the uterus of a large washhand basinful of this hydatiform mass.

The practice followed above I have since recommended in a similar case, and the result was equally satisfactory. I believe, therefore, that in any doubtful case of uterine enlargement, where a bloody discharge is going on to the injury of the patient—*where it is certain that no living fœtus exists*, and where the symptoms of pregnancy have previously existed, but have passed off—it may be safely laid down as a wise rule at once to dilate the cervix, and to explore the uterine cavity: if it contains any form of mole pregnancy, the sooner it is removed the better. The same applies to the case of a dead fœtus. If, on the other hand, it be a tumor which has enlarged the cavity of the uterus, that must be treated according to the rules given in works which consider these diseases. Dr. Madden has written a very admirable *brochure* on this subject, and has collected some cases in which, together with the hydatiform mass, there coexisted natural pregnancy, and in these cases he very properly objects to any interference with the ordinary course of gestation. I entirely agree with him in this; but the practice advocated above is intended only for those cases where hæmorrhage is going on to the injury of the patient. He remarks that "such practice cannot, however, I think, be approved of when we consider that hydatids may coexist with natural pregnancy, and the uterus may contain a healthy fœtus, which may be born alive at the ordinary period of gestation, although there have at the same time been hydatid growths in the uterus. Dr. Hall Davis, in a paper read before the Obstetrical Society, has recorded the particulars of a case in which a hydatid mole was expelled from the uterus immediately after a living fœtus and its placenta, at about six months' gestation, the hydatid growth being attributed by Dr. Davis to the degenerated ovum of a twin-conception. Dr. Hildebrandt has also recorded the case of a hydatid mole, together with a normally developed ovum. Cases such as these two last, the number of which could very easily be multiplied, are sufficient to demonstrate the impropriety and danger of the rule to which I have above referred. Far better would it be to let nature take its course in every case of hydatiform mole, for in due course the morbid growth will be surely expelled from the uterus, than by unnecessary interference run the grave risk of destroying a living fœtus." All this I cordially indorse, with this addition, that after the words "every case of hydatiform mole," in the last sentence, I would insert the words "where there were no symptoms which required treatment;" but undoubtedly where hæmorrhage is going on, the sooner the uterus is emptied of its contents the better will it be for the patient.

CHAPTER V.

SPURIOUS PREGNANCY.

SIR JAMES SIMPSON has very accurately described the condition to which this chapter refers. Many years ago, during my term of office as Resident Accoucheur's Assistant at King's College Hospital, I was one day sent for by a student to see a woman about forty years of age, who was said to have been in labor several hours. She had been married twenty years without issue. The student had made frequent examinations, and in answer to the inquiries of the patient and her friends, had expressed a confident opinion that all was going on well. Becoming at length, however, somewhat tired with the slow progress made, he sent for me, and on examination I at once discovered that the uterus was as though the woman had retained her virginity up to that hour! It was, in fact, a case of spurious pregnancy. As may be supposed, I had considerable difficulty in inducing the woman and her friends to believe my statement that she was not pregnant; but if she did not then, time no doubt soon dispelled her illusion. This may be taken as a fair type of such cases; there was abdominal swelling, but it was everywhere unduly resonant on percussion: its shape, too, was not that of pregnancy, it was too round and equable; there was suppression of menses; swelling, tenderness, and other mammary changes, but they were not such as would have satisfied me of pregnancy. There had been morning sickness, and there were now regular pains resembling those of labor. The patient was very hysterical and very anxious to have a child.

In these cases there is, of course, the absence of auscultatory phenomena, of enlargement of the uterus, and of ballottement; and though there may be many of the symptoms which belong to pregnancy, yet "there is generally some irregularity or defect in the sequence, or grouping, or character of these symptoms which distinguishes spurious from true pregnancy when minutely investigated, and it is upon this mainly that our diagnosis will depend. And however closely all the ordinary symptoms of real pregnancy may be represented and simulated in the spurious affection, and however minutely even the individual idiosyncrasies sometimes seen in the former may be imitated in the latter, there is usually some deviation from the ordinary course of events and some difference in the order and correspondence of the ordinary phenomena, which may serve to put you on your guard, and lead to the discovery of the true state of affairs" (Sir James Simpson). One almost unfailing test may be here mentioned, namely, chloroform; the full narcotic or anæsthetic influence of this agent will generally obliterate all the symptoms which have led to the mistake on the patient's part.

Spurious pregnancy may occur in women of all ages, whether they have previously borne children or not; and the chief point noticeable about the subjects of it is, that they are generally very hysterical, and often a good deal out of health; frequently, too, menstruation has been for some time disordered. The disease, if such it may be called, may last for many months, even beyond the ordinary duration of pregnancy, the woman still remaining firm in the belief that she is really pregnant; or the symptoms may last only for a few weeks, and then, either as the result of treatment or otherwise, may gradually disappear.

The *Causes* of this curious condition, and its exact pathological bearing, are not known. Many guesses have been made, but they are all unsatisfactory. Tympanitis is a leading feature; but to what this may be due, where exactly the gas is situate, or how it is developed, are points not yet clearly made out. Sir James Simpson thought that the condition probably depends "on some affection of the diaphragm, which is thrown into a state of contraction, and pushes the bowels downwards into the abdominal cavity." Clearly, however, the disease does not originate in the diaphragm; if it did, there seems no reason why it should not occur in the male, as well as in the female. It is much more likely that the disease is due to some defect in the function of ovulation. We know that this is often attended with considerable flatulent distension and abdominal enlargement; it is a condition which I have frequently observed in connection with ovarian disease of a so-called functional character. And, in the condition we are now considering, the cessation of the catame and the sympathetic disturbance in the breasts, in the stom and elsewhere, are all so many proofs of defective ovulat On the whole, therefore, I am much more disposed to treat disease with reference to the ovaries than elsewhere.

The chief indications for *Treatment* are—1st, to attend to general health, which will be usually found more or less derang 2d, to correct the disorder, if any, of the menstrual function; a 3d, to discover, if possible, and treat any local disease, especia when connected with the organs of generation, the uterus, ovaries.

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CHAPTER VI.

EXTRA-UTERINE GESTATION.

Few occurrences connected with pregnancy are more disastrous in their results than the arrest of the ovum in its journey from the ovary to the uterine cavity. Of the *Causes* of this arrest we know little or nothing. The idea which has found most favor regards it as due to some morbid condition, chiefly a narrowing of the Fallopian tube, either of an organic or spasmodic character. But this, though it may account for some, will certainly not explain all the varieties of misplaced conception. I am more inclined to think that this accident is not unfrequently associated with, and is a result of, some malformation of the uterus or Fallopian tubes. In two cases which have come under my observation where I had unfortunately the opportunity of making a post-mortem examination, I found this was the case: on the side where the ovum had been arrested the Fallopian tube joined the uterus at least an inch below the fundus, this of course occasioned a deviation in the Fallopian canal and the consequent arrest of the ovum in its passage to the uterus. It is remarkable, too, that this accident is much more apt to occur in unmarried women, and it has been thought that in them fright may have been the cause of the disaster.

The *Duration* of extra-uterine gestation depends very much upon the locality in which the ovum is being developed. Dr. Campbell, in his memoir on this subject, says: "In ninety cases in which we can decide, or nearly so, on the stage of the pregnancy, the fœtus in seventy-nine patients died at the close of nine months, or soon thereafter—one in the eighth, seven about the seventh, one in the sixth, two in the fifth, two in the fourth, five in the third, and one at the end of the first month." I cannot help thinking, however, that there is some mistake in these figures, for whereas Dr. Campbell seems to imply that the chances are largely in favor of the fœtus going on to the last month of utero-gestation, the experience of most men is certainly opposed

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to this; and taking the whole number and varieties of extra-uterine pregnancies, it appears that the chances of a rupture of the cyst increase with each succeeding month, and that very few pass beyond the fourth or fifth month.

There are four different forms of extra-uterine pregnancy, which are sufficiently distinct to be arranged under different headings. Other divisions of the subject have been made, but they are practically of little value. These are:

1. *Ovarian.*—In this variety the impregnated ovum is supposed to be detained within the ovary. This is a very rare form; indeed, some authorites deny its existence altogether, except in cases where a portion of the fimbriated extremity of the Fallopian tube, which has become adherent to the ovary, forms part of the cyst, and where, consequently, the proper name would be *tubo-ovarian.* No doubt there is great difficulty in determining the exact locality of the misplaced gestation in these cases of supposed ovarian pregnancy, but there seems to be no reason why, when the fimbriæ are applied to the ovary which is on the point of rupturing, the spermatozoa should not travel along the tube and actually penetrate the outer coat of the ovisac just as the ovum is escaping. In this way an ovarian gestation would be commenced. As a matter of fact such cases are on record, and it is difficult not to believe them. In the *New York Medical Journal* for 1865, vol. i, p. 141, a case of this kind is recorded by Dr. Kammerer, in which the cyst burst and the patient died, when "several quarts of blood were found within the peritoneal cavity; while on the left ovary, a rent revealing the source of the blood was seen. Opening the ovary an embryo was discovered about four weeks old." Another case is recorded in the work of MM. Bernutz and Goupil, which I translated for the New Sydenham Society, vol. i, p. 249. Generally cases of this kind run on for a longer time than in the tubal variety—namely, from five to six months. The pain they occasion is extreme, and death generally terminates the case by rupture of the cyst.

2. *Tubarian.*—This is the most frequent of all the forms of misplaced gestation. It seldom reaches beyond the period of three months. Occasionally rupture takes place as early as the first month. Rokitansky even relates one which occurred within a fortnight. More rarely still, as late as the fourth month; but it has been known even as late as the sixth month. The ovum may be retained in any part of the tube; the walls of the tube become

greatly distended, and envelop the ovum in a sort of cyst. Here, also, death occurs through rupture of the cyst, and the hæmorrhage consequent upon it, which is sometimes very extensive, amounting even to several pints.

3. *Interstitial* gestation is the name applied to those cases where the ovum is lodged in the substance of the uterine walls, at that part where the tube traverses the uterus; and as here the proportion of proper uterine tissue is great, the development may go on to a very considerable extent, the walls being proportionately thick and strong. There is, therefore, less risk of rupture, and accordingly cases of this kind will run on to the full term of pregnancy, and even beyond it; labor pains will then sometimes set in, and this has occasionally led to a rupture of the cyst wall. Curiously enough, in many of these cases, the placenta is found in its normal situation in the uterus.

The interstitial variety is undoubtedly the rarest of all the forms of extra-uterine pregnancy. By some writers it is regarded merely as a species of tubal gestation.

4. *Ventral* gestation is the only remaining form to be considered here. The ovum, after having escaped from the ovary, either never enters the Fallopian tube at all, or, having entered it, drops out again and falls into some part of the abdominal or pelvic cavity, where it soon becomes adherent, a cyst being developed round it. Very often, in these cases, the fœtus dies, and then the case terminates in one of the following ways: Either it may remain in the cyst for the rest of the patient's life, parts of it being absorbed; or the cyst may inflame and an abscess form, which bursts, and discharges its contents either into the abdominal cavity, when death is the certain result, or upon the external surface, when a cure may result, or into some of the viscera, such as the bowel, uterus, vagina, or bladder, and so may be discharged externally. This form of misplaced gestation may last for many years.

Wherever the ovum takes up its abode, there generally a placenta, cord, and membranes are formed; in regard to the latter, however, it is extremely doubtful whether anything like a true decidua is formed round the ovum; that something like, or in the place of, it exists, there is no doubt, but its true decidual character is at best very problematical. In a few rare instances a placenta has been formed in the uterus as well; and in most cases, if not in all, some of the ordinary changes take place in the uterus as in the early stages of normal pregnancy: for instance, the formation of a decidua is almost, if not quite, of constant occurrence; and there is usually some increase of volume and vascularity of the uterus itself. The decidua, after awhile, undergoes a process of disintegration, and finally almost disappears: hence, perhaps, the explanation of Dr. Robert Lee's opinion, that no decidua is formed in these cases.

Fœtal development takes place much as in ordinary gestation. With regard to the modes of termination of cases of extra-uterine gestation, these vary greatly. The more common mode of termination is by rupture, followed by death from hæmorrhage. The ovum may, however, escape into the peritoneal cavity, and there become encysted, and remain quiescent for many years. In one case the fœtus was retained after its death as many as fifty-six years, while in others openings are speedily effected in the way before mentioned, and the fœtus is expelled. There may be only slight constitutional disturbance, but generally either preceding the rupture of the cyst, or immediately after it, there is acute inflammatory action, with great febrile disturbance. Accompanying the rupture are symptoms of collapse, followed, as I have said, quickly in some cases by death through shock, hæmorrhage, or inflammation; in others the patient survives all this, and nature may either adapt itself to altered circumstances, the fœtus becoming again encysted in the abdominal cavity, or it escapes piecemeal through some natural or artificial outlet.

An interesting subject for inquiry in reference to these cases is as to their origin. The question is somewhat complicated by some very curious facts which have been observed by Drs. Arthur Farre, Oldham, and others, viz., that in cases of tubal pregnancy the true corpus luteum which no doubt provided the impregnated ovum, has been found on the side opposite to that in which the gestation existed: hence it is thought that in such a case the ovary which supplied the ovum was grasped by the fimbriated extremity of the opposite tube, and that the ovum was subsequently detained in that tube by the obstruction which existed at the bend of it. That the fimbriæ of one Fallopian tube can grasp the ovary of the opposite side is demonstrably proved by the fact that this has actually been seen on a post-mortem examination. On the other hand, it has been supposed that an impregnated ovum might pass from one Fallopian tube to the other across the cavity of the uterus; but at the least such a thing has never been proved, and I confess it seems to me very unlikely. I have already alluded to the fact that these cases of misplaced conception are not infrequently associated with some malformation of the generative organs, especially of the Fallopian tubes. It is easy to see how such a condition might arrest the progress of the ovum towards the uterus, and such has on many occasions been found to be the case.

The *Symptoms of extra-uterine gestation,* though they may vary a good deal in different cases, are tolerably alike in the several varieties. At first there is little to attract attention. There are the usual signs of pregnancy, though they seem to be under some disturbing influence, and do not present either that uniformity or regularity which accompanies normal gestation. Occasionally menstruation continues regularly, and sometimes there is rather severe hæmorrhage, leading to the inference that abortion has taken place. Almost always there is more or less pain from the very commencement, which is sometimes very severe: there is generally a feeling of weight and oppression deep in the pelvis. The pain is often very limited in extent; and there is occasionally tenesmus with diarrhœa, and much irritability of the bladder. The abdominal enlargement takes place, as a rule, not centrally, but on one side, and the tumor is very tender to the touch. Occasionally, but not always, the fœtal heart can be heard, though only over a limited space, and very feebly. Fœtal movement may sometimes be both heard and felt. But the most reliable evidence is obtained by examination per vaginam, for with the other symptoms of pregnancy the os and cervix will be found little if at all altered in size, though the cervix will be soft and spongy as in ordinary pregnaney, and is generally higher than usual: a tumor may also be felt above the vagina, either in the recto-vaginal pouch, or on one side of the uterus; the tumor will generally give rise to some displacement of the uterus, either it will be pushed against the pubis, or to one side of the pelvis, or else it will be drawn up almost out of reach. Occasionally some portion of the fœtus can also be discovered through the cyst-wall, and may be felt per vaginam, but this is not common.

As regards auscultation, little that is satisfactory can be made out as a rule, though sometimes the fœtal heart may be heard, and then it is higher than in normal pregnancy and more limited in extent.

When rupture has taken place, which happens mostly in the second, third, or fourth month—earlier in tubal than in any other variety—the symptoms very much resemble those of perforation of the stomach or intestine, except that they are often more severe, and with more sudden and complete collapse, followed by agonizing pain, cold clammy sweats, pallid anxious expression, quick feeble pulse, syncope from hæmorrhage, and death. Sometimes the patient rallies, acute inflammation of the peritoneum follows, and treatment may determine the result. In some few cases, especially those of the interstitial variety, nothing serious happens until the patient has reached the full term of pregnancy; then, when uterine action sets in, severe pain is the result, and rupture either of the cyst or of some large vessel occurs, in either of which serious hæmorrhage is likely to happen.

As a rule, if the fœtus has survived so long as the ninth month, it soon dies, though there are cases recorded in which it has lived for several months beyond. When the fœtus dies, disintegration and absorption begin, the tumor diminishes in size; it becomes harder and more solid in consistence. Occasionally after this, absorption and ulceration take place, followed by perforation of the cyst, through the vagina or rectum; then probably a gradual discharge of the fœtus piecemeal will be the means of removing all the contents of the cyst. There are some very remarkable cases on record showing the length of time that the fœtus may be retained in the abdomen—one by Mr. R. W. Watkins, in which a fœtus remained in the peritoneal cavity of the mother for upwards of forty-three years, without apparently giving rise to any remarkable constitutional disturbance, the patient ultimately dying of chronic renal disease. This case is recorded in the eighth volume of the *Transactions of the Obstetrical Society of London.* But a still more remarkable case occurred in the practice of Mr. Louis R. Cooke, and is recorded in the fifth volume of the same "Transactions." The patient was delivered at full term of a dead child, when it was observed that a large tumor existed in the abdomen. The patient died in forty-eight hours; and on opening the abdomen, a full-sized female child was found in the cavity, inclosed in its own membranes, and having apparently been developed in the fimbriated extremity of the Fallopian tube.

In regard to *Treatment;* if the nature of the case be clearly ascertained, absolute quietude should be enjoined, in order, if possible, to prevent rupture of the cyst. If this should occur, as it too often will do, despite all our efforts, then our next care is to recover the patient from shock, and at the same time, as far as may be, to moderate or control the hæmorrhage. But, supposing that rupture has taken place, and the fœtus is free in the peritoneal cavity; or if, without rupture of its containing cyst, the fœtus be dead, and is therefore only a foreign body, we shall then have to consider what should be done under these circumstances with a view to its removal. Opiates, anodynes, or sedatives may be given with advantage to relieve the pain and quiet the nervous system; and for the rest of the treatment we must be guided by general indications, the main object being by mechanical and physiological rest to prevent all local or general excitement. Sexual intercourse must, of course, be prohibited, and exertion of every kind should be avoided. The one primary indication calling for the use of drugs is the existence of pain; to relieve this is of the utmost importance, both for its own sake and for the effect it has on the patient generally, in the way of excitement.

Next to the allaying of pain comes the important question as to whether it is in our power to arrest the development of the fœtus by procuring its death, for there is no other way of staying it. Now, it has been proposed, and indeed actually practiced with success, to destroy the fœtus by an electric shock; an electro-magnetic current has been transmitted by two needles through an extra-uterine pregnancy with the result of not only causing an arrest of the growth of the tumor, but its speedy disappearance. Other cases have been successfully treated by puncturing the cyst, either per vaginam or abdominally, or per rectum, the result being the death of the fœtus, and its subsequent disappearance, in whole or in part. Lastly, it has been proposed to poison the fœtus by injecting an opiate into the cyst per vaginam, but I do not know of any recorded successful cases by this method.

When we remember how terribly fatal this form of pregnancy is, the mortality from all forms of extra-uterine fœtation being variously estimated at from 60 to 98½ per cent., the former having reference to the so-called ventral or abdominal pregnancy, the latter to the tubal variety, it is no wonder that all kinds of desperate expedients have been resorted to to prevent the continuance of the condition, and further experience of these unfortunate cases, together with more anxious thought on the subject, have induced me materially to modify the opinions I expressed in earlier editions of this work. I am, in fact, forced to the conviction that to allow patients so afflicted to die unaided by surgical art, and helped only by the puny feeble efforts of rest and opium, is a neglect of our duty as obstetricians. I think further experience will show that, with our enormous advance in abdominal surgery, we ought more often to resort to the operation of gastrotomy for the cure of such conditions as this. I would venture to suggest that in future cases of tubal, and tubo-ovarian pregnancy, ought rather to be regarded as cases of a terribly fatal form of tumor, which it behooves us to remove with the least possible delay, and that the operation of gastrotomy should be performed in anticipation of the almost inevitably fatal rupture which occurs in these cases. It is manifestly useless to wait till rupture has taken place, and when the patient is in a state of collapse, for not only will the operation be then infinitely more difficult, by reason of the great hæmorrhage which has taken and is still taking place, and which must seriously interfere with and obscure our proceedings, but the danger to the patient will be enormously increased. Seeing how fatal a thing rupture of an extra-uterine fœtation is—so fatal, indeed, as to be the rule with but very few exceptions—I think we can hardly increase its fatality; on the contrary, I believe that if we forestall the rupture by removal of the growth by gastrotomy, we shall greatly diminish it. We should in such case treat the Fallopian tube like the pedicle in an ovarian tumor, and after securing it by a ligature, remove the distal portion just as we do an ovarian growth.

When rupture occurs, we must try to arrest hæmorrhage, to sustain strength, to relieve pain, and to excite reaction from collapse: we should, however, wait until it is seen what course nature is likely to take, and as far as possible we should aid her in her efforts.

Supposing, however, that no rupture has taken place, and that the patient has gone on to the full term of utero-gestation, the fœtus perhaps being developed meanwhile, the question then of performing gastrotomy will have to be considered, especially as it is well known that success has attended this practice in some few cases. The result has sufficiently proved that there is less risk in this operation than in allowing the continuance of that constitutional disturbance which the presence of a dead fœtus occasions. In a few cases, suppuration has taken place within the cyst, and the matter has found its way out, either through the abdominal wall, or through the vagina, rectum, or bladder. A large proportion of the cases in which this has happened have quite recovered. "Of thirty cases in which gastrotomy was performed, twenty-eight recovered;" while of twelve which were operated upon after suppuration had occurred, ten recovered. On the other hand, "of nine women operated upon during the existence of fœtal life, or soon after its extinction, the whole died." This seems to show that operative interference during the lifetime of the fœtus is terribly fatal; while if the fœtus be dead, it is hardly justifiable to subject the mother to any great risk unless her condition is such as to render it absolutely necessary, and the only ground for this would probably be the existence of serious constitutional disturbance, arising out of an attack of inflammation and suppuration of the cyst, or its contents.

Where the operation of gastrotomy has been performed, the placenta will generally be found firmly adherent, and its removal has proved so disastrous from hæmorrhage, while cases in which it has been left to come away by itself have been often so successful, that the rule is now, I think, pretty well established, viz., to leave the placenta alone, and allow it to come away through the lower part of the abdominal wound, which must of course be left open for that purpose. No doubt such an operation as this is not warrantable except in great urgency. If the child is alive and viable, and has arrived at about full term, we ought certainly to give some thought to it, and attempt to extract it abdominally from its unfortunate position. In like manner, if it be dead, and is causing serious constitutional disturbance to the mother, then also its removal is called for. But if matters are quiet, the case had better be left to nature's kind keeping. No doubt statistics, as we have seen, seem to prove that the operation of gastrotomy is more dangerous if performed during fœtal life, with the view of preserving it, than when performed after its death, but this may possibly be modified by further experience, and certainly I should recommend its adoption under the circumstances I have mentioned.

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CHAPTER VII.

SUPERFŒTATION.

Much discussion has arisen as to the possibility of a second conception taking place while the uterus is still occupied by one embryo. Formerly no doubt appears to have existed on the subject. The idea was accepted almost without question, and certainly without any inquiry as to its possibility on anatomico-physiological grounds. Of late years, however, the question has been very seriously criticized, and though, on the whole, the balance of evidence appears just now to incline somewhat in favor of it, yet it must be admitted that the question is by no means absolutely settled, for many of the cases relied upon in support of the doctrine will certainly not bear examination, seeing that they are explained satisfactorily by much simpler processes than are involved in the theory of superfœtation.

We must be careful to distinguish between this condition and that known by the term superfecundation. The former implies a multiple pregnancy occurring at different periods, one on top of the other, as it were; the latter refers to plural gestation, in which the act of fecundation fertilized more than one ovum at the same time.

The facts which are adduced to support the doctrine of superfœtation are these:

First, that women have been known to bring forth two or more children at a birth, one of which has been found blighted; and it has been surmised that the latter was a subsequent conception to the former. Now, here it may be remarked, in reference to this, that there is nothing in this circumstance which at all proves the theory of superfœtation; nor, on the other hand, is there anything which militates against the view that this was an ordinary case of twin pregnancy, in which, from some cause or other—and there are many such—one of the fœtuses died but was retained in utero, while the other lived and went to full time, after the birth of which the blighted specimen appeared.

Secondly, in cases of twins born alive, one has been much more perfectly developed than the other. Here, again, the same objection may be taken: arrested or retarded development is not very uncommon, and this is amply sufficient, even without calling in the aid of an almost impossible theory, to explain the phenomena.

Thirdly, twins of different color have been born of colored women—the one a short time subsequent to the other—where it was proved that the woman had had connection with both white and black men. In regard to this statement of fact, it must be remembered that, in the cases quoted, it is admitted that intercourse with the two men who were supposed to be the fathers of the two differently colored children took place at or about the same period, certainly within a very few days of each other. So, that here again the facts, as related, are perfectly compatible with the view that the two conceptions took place at about the same time; probably, therefore, there is nothing more strange in this case than in any other case of multiple gestation, except that the reputed parentage was traced to two men instead of one, and they of diverse color and race.

Lastly, cases are on record where women have borne fully developed children a month or two after a previous delivery. Here now is the real difficulty, and it is the first argument which at all touches the question at issue. How, then, is it to be explained, if we reject the theory of superfœtation? Either we must admit that, both children being conceived at the same time, the delivery of the first was premature, while that of the second was at the normal term; or the first may have been born at the proper time, while the delivery of the second was delayed. This, however, is on the supposition that both ova were developed in one uterus; but it is certain that, with regard to some of the cases of supposed superfœtation, the real explanation is to be found in the existence of a double uterus, in both of which conception has occurred; and it may be, of course, that one has happened some time after the other.

All these explanations are, however, beset with difficulties. Cases of double or bihorned uteri are probably quite as rare as genuine cases of superfœtation. I have seen two instances of this deformity, in which there were not only double uteri, but double vaginæ also, and though I could quite understand conception occurring in both of them, yet, as a matter of fact, it had not occurred in either.

Dr. Matthews Duncan has attempted to meet the difficulty by reference to the anatomical facts of early pregnancy. He says, and truly, that until about the third month, the uterus is not really absolutely closed, for until the ovum is so far developed that the decidua reflexa is brought into close contact with the decidua vera there is, he believes, ample room for the passage of spermatozoa, and though it may possibly be true that ovulation is suspended, at least as a rule, during the greater part if not the whole of pregnancy, yet there may well be exceptions to this rule, and especially during the earlier months.

On the whole, then, there does not appear, from a consideration of all the facts and circumstances, to be any absolute bar, either in the anatomy or in the physiology of gestation, to the possibility of superfœtation occurring within the first three or four months of gestation. But, while admitting this, it must also be confessed that the occurrence is of extreme rarity; that some of the cases so called are not such in reality, and that where it does occur, it is probably by the means last pointed out by Dr. Matthews Duncan.

Especial care must be taken to distinguish between cases of true superfœtation and what we may call false cases, in which there has been merely a twin conception, one of the fœtuses having died or been blighted at an early period of gestation, and has not afterwards become developed; though it might not be expelled until the time of delivery of the other child. It will generally be found in these cases that the blighted one is more or less flattened. A case of this kind I recorded in the first volume of the *Obstetrical Transactions.* Sir James Simpson considered that this flattening is probably caused by the protecting medium of the liquor amnii being defective, in consequence of which one fœtus is pressed between the parietes of the uterus on the one hand, and the living twin or its membranes on the other. He also stated, that "occasionally when one of twins dies early in pregnancy, it is after a time expelled, when it happens to be situated near or over the os uteri; afterwards the uterus closes, and pregnancy goes on to the full time with the remaining living child."

In the case of the children of different color, as I have already said, they may have been simply the result of the almost simultaneous impregnation of two ova by the spermatozoa of a white and a colored man. Of course, for this to be true, the second impregnation and the second delivery must follow each other within a few days; if weeks or months elapsed, then the objection taken would not apply.

It is only, then, where one fully developed child has been born some two, three, or four months after another, the uterus being normal; or where, as in a case recorded by Dr. Tyler Smith, an abortion has occurred, the fœtus being, say four or five months, and is followed soon after by another of a different age, that the doctrine of superfœtation can be legitimately inferred. The condition of the uterus which is permanent in some animals, and which finds its counterpart temporarily in the early development of the organ in the human subject, may, as I have said, be found present in adult life—the condition, namely, of a double or bihorned uterus: in such cases, no doubt, it is quite possible, after a conception in one part of the uterus, for a second to take place in the other half of the organ. Such a case, in fact, has been recorded by Madame Boivin. In all cases, therefore, of suspected superfœtation this point must be carefully inquired into. But this will not explain all; for there have been many instances of so-called superfœtation, in which no evidence whatever existed of such a condition of the uterus as is here mentioned.

It is no doubt extremely difficult, knowing what we do of the changes which take place in the uterus soon after conception, to understand how impregnation can be effected with an ovum still occupying the uterine cavity. It has been already shown that the uterine decidua adheres very closely to the cavity of the uterus, and therefore the passage of the seminal fluid through it to reach the Fallopian tube or ovary would appear to be absolutely impossible. Dr. Matthews Duncan has, indeed, as I have already stated, offered another theory to account for the fact, but this view still wants confirmation. No doubt if it be really the case, as he says, that the decidua reflexa does not become adherent to the decidua vera till after the third month, prior to which sufficient space exists to admit of the passage of the semen, and consequently to allow of a subsequent conception, it will fully explain most, if not all, the cases of superfœtation which are on record; at present, however, it certainly appears to be doubtful. Dr. Ramsbotham entirely disbelieved the possibility of superfœtation after the fourth month, and in this view probably most obstetricians agree. He explained all the cases reported, by assuming that there must have been a double uterus in each case. He cited some in which two connections followed each other quickly, and were both prolific; " in such there is no doubt that the woman conceived of the second before the first ovum had entered the uterine cavity; before the formation of the deciduous membrane, and before the mouth and neck of the uterus were plugged with the tough gelatin secreted by the *glandulæ Nabothi.*"

CHAPTER VIII.

DISPLACEMENTS OF THE GRAVID UTERUS.

THE various displacements to which the uterus is subject in the unimpregnated state may also occasionally be met with during gestation, and they are then, for the most part, more difficult to manage and more serious in their consequences. It does not appear that displacements of the non-pregnant uterus are in any way a cause of displacement during gestation; to a certain extent, probably, one form, prolapsus, is a nearly constant accompaniment of pregnancy, and this simply by the law of gravitation. In many cases nature herself, unaided, effects a cure in one of two ways,—either by the gradual development of the uterus, which thus restores it to its normal position; or by the expulsion of its contents.

Of all the displacements of the gravid uterus, that which, perhaps, most frequently comes under notice is *Retroversion;* and hence it has attracted the greatest share of attention. It consists of a turning backward of the fundus uteri, and a consequent tilting forwards and upwards of the cervix, so that the os, instead of facing the lower part of the hollow of the sacrum, comes to look towards the symphysis pubis; it may even be directed upwards, above the symphysis pubis. The cervix lies across the roof of the vagina; the fundus occupies the hollow of the sacrum.

The *Symptoms* have generally a reference to the neighboring viscera, the bladder and rectum. There is, at first, difficulty in passing water, and this may ultimately become quite impossible without artificial assistance: this is caused by pressure of the cervix uteri on the neck of the bladder. In cases where the uterine displacement has been produced suddenly, this symptom may be the first to appear, and may come on, as it were, all at once. In other instances, where the displacement occurs more gradually, this symptom manifests itself more slowly; at the same time there is frequent desire to empty the bowel (tenesmus), with inability to do so, even after much straining. This difficulty is caused in a similar manner, by pressure on the rectum, and may be produced suddenly or more gradually. With all this there are violent bearing-down pains, accompanied by a general sense of fulness and distension about the lower part of the body, with dragging pains in the groins. These symptoms may be very slight, or they may be so severe as to be quite unendurable.

On examination per vaginam, it will at once be noticed that the position and direction of that canal are considerably altered; that, in fact, the altered position of the cervix has drawn the vagina up behind the pubis, in which situation, after some little difficulty, the os will generally be discovered, looking either directly forwards or forwards and upwards; sometimes, in the more aggravated cases, the os is thrown so much upwards by the fundus being thrown down, that it becomes quite impossible to reach that part. Posteriorly filling up the hollow of the sacrum, will be felt a large hard globular mass, which is the fundus uteri, over which is stretched the posterior wall of the vagina, while above, and running across the roof of the vagina, are the cervix and body of the uterus.

In cases of slight displacement, there is very often, instead of the great difficulty of passing water, a frequent desire to do so, with possibly slight incontinence; this is due to the irritation which the slighter pressure on the neck of the bladder occasions: on the other hand, even a slight pressure on the rectum produces constipation, and this, after a time, aggravates the evil by the accumulation of fecal matter above the fundus pressing the latter further backwards and downwards against the rectum. Of course, we must expect that the severity of all the other symptoms which the patient suffers will be in exact proportion to the degree of displacement.

The *Cause* of retroversion of the gravid uterus has been, and is still, a *quæstio vexata* among obstetricians; for while some affirm that it is brought about by a distended bladder, others believe that this is a result, and not a cause, of the displacement. By those who hold the former view, it is supposed that by the gradual development of the uterus pressure is exerted on the neck of the bladder, and that, in consequence of the difficulty of passing urine, the bladder becomes distended, the fundus of the uterus is accordingly pushed backwards, and this gradually increases until complete retroversion is the result; or, with the same distension of the bladder, some sudden and violent exertion throws the uterus back at once, and the symptoms are manifested suddenly. On the other hand, it is believed that retroversion is brought about by some other cause quite independent of the condition either of the bladder or rectum; possibly by the gradual growth of the uterus itself, under a relaxed condition of its supports, or by some sudden and violent exertion. Some have thought that it might arise from an arching forward of the sacral promontory, the fundus impinging against it in its upward growth, and being by it directed to the hollow of the sacrum below. In any case, the immediate *result* of such displacement would be great difficulty and ultimately impossibility of voiding urine, with, at the same time, great desire to do so. With this also, would come fecal accumulation above, and pressure from this source also on the misplaced organ; in this way what before had nothing to do with the displacement—what, in fact, was simply a result of it—now becomes a means of keeping up the irregularity, and the chief obstacle which the practitioner has to contend with in effecting a cure.

In some persons we find that a very slight cause suffices to bring about retroversion: in them, the fundus uteri being ordinarily much larger and heavier than the lower portion—top-heavy, as it were—is easily thrown over; and this is especially the case during the third and fourth months of gestation. Dr. Milne writes—"Given a top-heavy uterus, not much exceeding the fourth month, lax ligaments, broad and round, a flaccid vagina, a flabby perineum, and a deeply excavated sacrum, and you have the complete complement of prerequisites for the overthrow of the womb, without assaults for the abdomen or bladder." To all of this I certainly assent; indeed, I have elsewhere so strongly advocated the view in regard to the non-pregnant uterus, that uterine displacement is in most, if not in all cases, a consequence of previous disease, chronic inflammation chiefly, that I most cordially indorse Dr. Milne's views in regard to the gravid uterus, which he thus expresses: "I believe that there are certain causes, predisposing, indispensable to retroversion, and of paramount importance, as capable of inducing it; that there are also certain exciting causes which occasionally co-operate, but which must be viewed as subordinate. Moreover, that the most important cause is an unusually large pelvis, with a deeply concave sacrum. They may be thus tabulated:

"*Predisposing and important*—
- "1. Large pelvis, with deeply concave sacrum.
- "2. Relaxed supports and increased weight of uterus (leading to prolapsus, and change of axis to that of outlet).
- "3. Increased weight of fundus, rendering the womb top-heavy; due to impregnation, and characteristic of the earlier months.

"*Exciting and subordinate*—
- "Forces acting on the uterus.
- "1. Distended bladder.
- "Action of abdominal muscles."

In multiparæ, particularly those of a weak and relaxed habit, the attachments readily yield to any undue pressure which may be exerted on them from above, either by the intestines or the abdominal muscles; and though these may at first produce very slight displacement, yet the now altered direction of the long axis of the uterus, and the broad anterior surface of the organ being exposed ever so little to the pressure from above, with the *inclination* to further displacement, the evil is soon and easily increased till complete retroversion takes place. Moreover, the hollow curve of the sacrum offers little obstruction to—indeed it rather facilitates—the irregularity. That the strength and condition of the uterine supports have also much to do with this displacement seems confirmed by the fact that it is very seldom met with in primiparæ. Other causes have been enumerated—such as the pains of a threatened abortion, tumors upon, or in the neighborhood of the uterus, lifting heavy weights, straining at defecation, strong mental emotion, and sudden and violent contractions of the diaphragm, as in severe vomiting. There is no doubt, however,—be the cause or the starting-point of the process what it may,—that the subsequent steps are those which have been detailed above.

The *Treatment* of this affection will be difficult or otherwise, in proportion, first, to the period at which gestation has arrived; secondly, the time which has elapsed since the displacement was effected; and thirdly, the condition of the neighboring viscera. It will be more difficult at the fourth than at the second month; more when it has lasted some time than when of recent occurrence; and more also when the rectum and bladder, especially the former, are full than when they are empty. Indeed, the first object in attempting to restore the displacement is to clear the way for its return by unloading these viscera.

Sometimes, though very rarely indeed, the organ is replaced without any interference, by simply placing the patient in what is called the knee-elbow position, or, better still, on the knees and chest, so that the upper part of the body is the most depending. Should this not suffice, and I have never yet seen it do so, the first thing requiring attention is the bladder; the catheter (a male elastic one will be found the best) must be introduced, and in doing so the altered position and increased length of the urethra must be borne in mind. A little reflection on the description given above of the relative situation of the parts will at once suggest the direction which the catheter should take—namely, upwards and somewhat backwards beneath and behind the symphysis pubis. The bowels should next be emptied, and an enema is the best mode of effecting this. Sometimes, however, this only aggravates the mischief: for I have seen the contents of the bowel not only undisturbed after an enema, but greatly increased, and the malady, therefore, made worse by the non-return of the injection. This is more likely to happen the larger the uterus and the greater the consequent pressure. It is well to use a small injecting-tube, and great care is needed in its introduction. We should also be quite sure to introduce it beyond the situation of the fundus uteri, otherwise the fecal accumulation will not be reached at all.

Should we be unsuccessful in this, and the uterus still remains misplaced, we must then try to replace it by manipulation. According to some authors this is a very easy matter; by others it is sometimes spoken of as extremely difficult. I must confess I have never found it so very easy. Dr. Oldham says, that by placing the patient on her elbows and knees, with the pelvis higher than the rest of the body, and introducing the finger into the vagina, a little pressure exerted on the fundus uteri will readily and without difficulty restore the organ to its natural place. Others recommend that one finger should be introduced into the vagina, hooked round the cervix, and an attempt then be made to pull it down, while another finger of the other hand is passed into the rectum to press the fundus upwards and forwards. This, however, is not only an unpleasant proceeding, but is also very clumsy, painful, and difficult, while it has no corresponding advantages. Some have suggested the introduction into the vagina of a speculum, so as to allow the pressure of the external air to be exerted on the fundus; while others have advised the injection of water for the same purpose; others, again, the employment of air or water pessaries.

If the bowels and bladder have been well emptied the plan of Dr. Oldham will sometimes suffice. In very urgent cases, where all other means have failed, it has been necessary to puncture the uterus with a small trocar to let out the fluid, and then effect a replacement. Such a proceeding, of course, involves great risk; abortion is sure to follow, but that will be preferable to allowing the patient to go on unrelieved. There are cases on record where this has happened; the woman has gone to full term, and labor itself has gradually restored the uterus to its proper place, the attendant suffering having meanwhile been most acute, while the risk to which the patient has been subjected is very great.

Chloroform will always be found an invaluable remedy in difficult cases; it should be given so as to produce complete relaxation of the muscles. After the replacement, the bowels and bladder should both be carefully attended to, as there is always, for a time at least, great liability to a recurrence until the uterus has risen considerably above the pelvic brim.

As preventive measures the patient ought, for a few days at least, to maintain the recumbent posture, and great care should be taken to secure daily action of the bowels, together with frequent relief to the bladder. Immediately after replacement an opiate should be given, and should the bladder have been injured by the pressure to which it was subjected, or by the prolonged retention and consequent decomposition of the urine, it may be necessary to use the catheter for some few days. Tonics, especially quinine, iron, and strychnine, will be of great service subsequently.

Anteversion is the opposite condition to the one just considered. It is of extremely rare occurrence, some having even denied the possibility of such a displacement.

The condition of the parts is as follows: The os uteri will be found on examination to be very high up towards the promontory of the sacrum, and looking directly backwards; the cervix, as in the last case, lies across the roof of the vagina, while the globular fundus will be found behind the symphysis pubis, pressing against the neck of the bladder, and causing at first great irritability of the bladder with difficult micturition, afterwards complete retention, the urethra being jammed against the pubis.

The causes of this displacement are similar to those of retroversion—namely, violent exertion, straining, lifting heavy weights, mental emotion, etc., not, of course, including the supposed causes of retroversion—a distended bladder or bowel.

The *Symptoms* are tenesmus, constipation, dysuria, or complete retention of urine, pain of a dragging, forcing character, and a general sense of fulness and discomfort about the pelvis. The real state of things can, however, only be made out by examination per vaginam.

Treatment.—Place the patient on her back; empty the bladder and rectum; press the fundus upwards and backwards with two fingers in the vagina; and, some say, draw the cervix downwards by hooking the forefinger round it. Afterwards, keep the patient on her back for a little while, and attend frequently to the bowels and bladder: in a few cases no treatment at all is necessary, the uterus righting itself as pregnancy advances.

Anteflexion of the gravid uterus is so extremely rare that the following case, which occurred in the practice of the late Dr. Ashwell, deserves a place here, especially as it may be taken as a type of these cases, and both the symptoms and physical signs are well described. A lady, thirty-three years of age, the wife of a medical man, in the first month of her pregnancy, fell down a flight of steep stairs. At the time the bowels were exceedingly constipated. There was no hæmorrhage, but a state of syncope lasted for nearly an hour. For the ensuing six or seven weeks she was never free from a heavy bearing-down sensation in front, which rendered micturition frequent and painful, but in no way interfered with defecation. She was also irritable and feverish; and it was thought by the husband that the womb was retroverted. Dr. Ashwell first saw her at the end of the third month; and on examination found the cervix uteri in its natural position, while the fundus was lying forwards, between the anterior wall of the vagina and the bladder, being felt in the form of a round, solid tumor. The cervix was more elongated, fuller, and harder than natural; the os was open; and pressure at the point of flexion caused pain. Attempts were made to effect reduction by placing the fingers of the left hand behind the pubis, so as to raise the fundus, while the forefinger of the right hand was employed to draw the cervix downwards and forwards. As these efforts failed, the case was left alone. An examination at the sixth month satisfied the husband that the curvature had nearly disappeared; and although the patient was not quite free from suffering during the remainder of her pregnancy, yet she was delivered without any difficulty, and completely recovered.

The vaginal examination in a case of anteflexion of the gravid uterus reveals what is, to all intents and purposes, a magnified condition of the signs which are observed in the non-pregnant state: the uterus is bent into a kind of retort shape, the cervix being posteriorly, the fundus in front. The former, though large in proportion to the period of gestation, is yet relatively less so than the fundus, which is felt as a globular mass occupying a good part of the front of the pelvis; but being pushed into the hollow of the sacrum, the point of flexion is ordinarily at about the level of the internal os.

In regard to *Treatment*, here, as in the case of retroversion, it is important to empty the bladder as soon as possible, for as this viscus fills and is distended, it rises above the flexed fundus, presses upon it, pushes it down into the pelvis, and hinders its reposition. After the use of the catheter, the patient should be placed on her back, with the pelvis raised, and the shoulders depressed; gentle pressure may then be made for a few minutes upon the fundus with two or three fingers placed flat upon it. This may be repeated at intervals; but should it fail to secure replacement, the case had better be left, as in all probability the uterus will right itself during its subsequent development.

Prolapsus uteri is, within certain limits, the normal condition in the early weeks of gestation, and is occasioned by the increased weight of the organ, together with a certain relaxation of its ligamentous supports. Sometimes, however, this normality is exceeded; the degree may vary from slight displacement to complete protrusion beyond the external parts. Generally after the fourth month, when the uterus is becoming too large to be retained in the true pelvis, this malposition is cured by the gradual rising of the organ above the pelvic brim into the abdominal cavity. This is the rule; but some very extraordinary cases are reported in which the patient went to full time with the uterus *still* protruding.

The *Symptoms* are a dragging, bearing-down pain, felt mostly in the loins, groin, inner and upper part of the thighs; dysuria, occasionally constipation, with general discomfort about the pelvic region. It will be easily recognized on introducing the finger into the vagina, the os being felt near the external parts, or if the cervix protrudes the nature of the case will be understood at a glance.

The *Treatment* consists of rest in the recumbent posture, attention to the bladder and bowels, support to the uterus by means of bandages, cold bathing, astringent injections, and tonics. Mechanical treatment, other than the mere external bandaging, will be more likely to produce irritation and distress than benefit. Quietude is of great importance, inasmuch as abortion is not at all unlikely to happen as a result of this condition.

CHAPTER IX.

PREMATURE EXPULSION OF THE EMBRYO.

Abortion, or premature expulsion of the embryo, may occur at almost any period within the nine months of gestation, and has been variously named according to the time at which it happens: thus, when it occurs within the first four months, it is termed *abortion;* after that period, and before the seventh month, the term *miscarriage* has been applied; and when it takes place after the seventh month, but before full time, the term *premature labor* is given to it. This classification was originally adopted by continental practitioners, and it has been accepted by many in this country; but practically, the division into two classes, abortion and premature labor, is sufficient: the first may be held to include all those in which expulsion takes place before the end of the sixth month; the latter embracing all the rest. The basis on which this classification is founded is the viability or non-viability of the child; and although seven months is the earliest period at which we usually expect a child to survive, yet there have been many cases in which six months' children have come to maturity.

Taking a large number of cases of abortion as a basis of calculation, I find that it much more frequently happens at what would otherwise be a catamenial period. I have not found that it is more often in first than in subsequent pregnancies, as was formerly supposed; on the contrary, my experience fully confirms that of Mr. Whitehead, who says that the "third and fourth, and subsequent pregnancies, and one or two of the last—those, namely, which occur near the termination of the fruitful period—are most commonly unsuccessful."

Of the eight children indicated in the following table as being born alive at six months, seven perished within six hours after birth, and only one attained to the age of ten days. Of the seventeen born alive at seven months, the majority lived over several days, a few to the end of the third and fourth week, and three were alive at the end of nineteen months. Eleven of those born alive at seven months, and three of the five born alive at eight months, perished from a disease of a specific nature inherited from the mother. In three of the cases the event was attended with fatal consequencss to the mother: one, in which delivery occurred at the seventh month, being a case of placenta prævia, where the expulsion had been preceded for several days by a constant and profuse hæmorrhage; one was a case of malignant degeneration of the uterus; while the third was a case of twins, at about the seventh month of their intra-uterine growth, in which delivery was followed by alarming prostration, symptoms of uterine phlebitis setting in, and death taking place on the sixth day.

A Table showing the Period of Pregnancy at which Abortion occurred in 602 *cases.*

Period of Pregnancy at which abortion occurred.	Number of births at each period.	Number still-born.	Number living at birth.	Number living at the end of a month after birth.
Two months,	35	...	...	...
Three "	275	...	...	...
Four "	147	...	...	...
Five "	30	...	...	...
Six "	32	24	8	...
Seven "	55	38	17	3
Eight "	28	23	5	1
Total,.	602	85	30	4

In some *Notes on Causes of Early Mortality*, Dr. Whitehead says that abortions are by far the most common during the first three months of pregnancy, and especially during the first third of this period. After the third month and upwards to the sixth the greatest number take place in the first, a smaller number in the second, and the fewest in the third portion of this term, the numbers standing for these respective epochs in the co-ordinate relation of nine, five, one. He further finds that the number of premature births during the last three months of pregnancy is about one-fourth of the number during the preceding three months. "Thus it will appear, that for every premature birth during the last three months of pregnancy, there are four abortions during the preceding three months. And taking it for granted that the number of such events during the first three months exceeds those of the second, in the same ratio as the latter do those of the third —which is by no means improbable—then the relative frequency of immature births in the first, second, and third epochs of pregnancy of three months each, will stand in the progressive order of sixteen, four, one.

"Supposing, further, that of the 43,752 children still-born in France, in 1858, 20,000 were premature, which is doubtless quite within the actual estimate; the number of abortive births in that year, exclusive of the premature, would, according to the preceding mode of calculation, amount to the sum of 1,280,000, against 969,343 live births all included."

Premature expulsion of the ovum is generally regarded, and not without reason, as more dangerous in the later months than ordinary labor; this arises chiefly from the greater liability to hæmorrhage, which is often of a very severe character; but partly from the difficulty which is often experienced in extracting all the fœtal membranes. It is well known that the attachment of the ovum to the uterus is firmer at any time of gestation than in the last four weeks. So noticeable, indeed, is the difference, that Sir James Simpson considered that possibly the determining cause of labor was the gradual disintegration and separation of the ovular membranes from the uterine parietes. Hence, probably, the want of this disintegrating influence is the reason why it is sometimes so difficult in cases of abortion to secure the separation and expulsion of the membranes. At any rate, there is no doubt of the fact, and the danger is proportionally increased.

The *Causes* of abortion are numerous, but they may conveniently be classed under two divisions:

First, those which act directly on the uterus and induce expulsion of its contents.

Secondly, those which occasion the death of the fœtus.

The middle and upper classes seem to be more prone to abort than the lower, excepting those among the latter who are very ill-fed, much exposed to vicissitudes of weather, and very hardly worked, especially in lifting heavy weights or making other violent exertion. From a collection of about two thousand cases in hospital practice, I find that about one woman in every 3⅛ aborts; that of 327 women of all ages who aborted, 166 did so once; 103, twice; 41, three times; 11, four times; 3, five times; 1, six times; 1, eight times; 1, nine times.

The causes which act directly on the uterus and excite contraction, without, it may be, previously destroying or injuring the embryo, are, violent mental emotion, exposure of the patient to sudden changes of temperature, as in bathing in hot or cold water; here uterine action is excited in a reflex manner, and the same thing may happen where an irritation starts from some part of the alimentary canal, as from the presence of ascarides, violent purgation, dysentery, or fecal accumulation. In a similar way, reflex contraction may be excited by lactation or by operations upon the breast; by irritation of the trifacial nerve, as in the extraction of a tooth; or by irritation of the renal nerves, as in calculus of the kidney. In all these cases the vitality of the embryo is probably not affected until expulsion is accomplished.

On the other hand, though there seems in some persons a remarkable liability to abortion through the influence of reflex action, in others, violent mental emotion, serious accidents, diseases, injuries, and operations even of great magnitude, and on parts which would *a priori* be thought to be specially dangerous in this respect—such, for instance, as the breast, the uterus, vagina, and even the ovaries, as in ovariotomy—are endured without producing the slightest ill-effects.

The reverse of this obtains, however, in abortions arising from constitutional changes: here the death of the embryo is usually the first step which leads to its expulsion. As instances, I may mention, first, a hyperæmic condition of the blood, which "produces, as it were, an apoplectic state of the uterine sinuses forming the maternal portion of the placenta; blood is extravasated between the ovum and the uterus; their connection is more or less destroyed, and the death of the fœtus becomes unavoidable: hence in these cases the expulsion may result either from the latter circumstance, or the uterus being irritated to contract by the effused blood between itself and the membranes."

In the same way abortion may result from the opposite state to this—namely, anæmia—and in any of those constitutional states producing general debility, whether arising from improper or insufficient food, from exhausting discharges, severe mental or bodily suffering, or from the existence of any special disease, acute or chronic—syphilis, mercurial salivation, the influence of chronic lead poisoning, small-pox, continued fever, etc.; in all these and similar cases, expulsion is due to the death of the fœtus.

Among other causes may be mentioned local diseases or displacements of the uterus, ulceration, chronic inflammation and hypertrophy of the cervix, congestion of the uterus produced by undue sexual excitement, and according to Madame Boivin, adhesions of the uterus to surrounding organs, the result of previously existing disease.

Some females seem to acquire a habit of aborting, and have been known to do so in twenty-two successive pregnancies. Some cause for this will, however, generally be found, if the history of the case be carefully inquired into. In one instance which came under my own observation, a lady had aborted seven times successively, when it was discovered that there was a retroflexion of the uterus. This was cured, and the patient afterwards had a child at full time. Irritability of the uterus, especially in neuralgic subjects, or those subject to dysmenorrhœa, may also occasion abortion; but perhaps the most constant cause of recurring abortion is the existence of a syphilitic taint. I have traced this as a cause in very many instances, and am led to believe that this result is due to the influence of the syphilitic poison on the chorion structures; for in several cases where premature expulsion has occurred in the later months of pregnancy, the child being still-born and marked with very unmistakable signs of syphilis, in all of these the placenta has shown remarkable evidence of syphilitic degeneration. From this I infer that cases of abortion in the earlier weeks of pregnancy are probably due to the same degenerative influence.

Diseases of the fœtus itself, or of its membranes—such as peritonitis, convulsions, hydrocephalus, chest disease, disease of the chorion, amnion, or placenta, of which latter there are many varieties, syphilis and fatty degeneration being the most common—may produce embryonic death, and is pretty sure to be followed by expulsion.

The *Diseases of the Placenta* are probably the most fertile causes of abortion acting through the fœtus, and undoubtedly those I have just alluded to are the most common, viz., syphilitic and fatty degeneration; but we may have also inflammation, placentitis, hypertrophy, and induration, tubercular deposition in the substance of the placenta, and hæmorrhage into it of an apoplectic character. The length of time which may elapse after the placenta has become diseased before the expulsion of the fœtus occurs, varies, of course, a good deal, being influenced both by the nature and extent of the disease.

Where abortion occurs before the formation of the placenta, we may often find evidence of disease in the chorion villi; this is especially the case with fatty degeneration, which may be detected both in the cells and in the walls of the bloodvessels. There is, of course, room for doubt as to whether the death of the embryo is the cause or the consequence of this fatty degeneration; for we have no means of determining exactly, before the period of quickening, whether the fœtus be dead or no.

Railway, or other modes of travelling, will often produce miscarriage, though in most cases there will be found previously existing disease. The time at which expulsion takes place after embryonic death, varies with the period of gestation. In the early and latter months it usually follows speedily; but in mid-pregnancy several weeks, or even months, may elapse before it occurs.

The *Symptoms* of threatened abortion are hæmorrhage and pain: the former is due to separation of the membranes and consequent laceration of the bloodvessels; the latter to uterine contraction. The severity of both these symptoms will, of course, vary with the duration of the pregnancy: if it be of recent occurrence, it may be that the patient will only regard it as a modified catamenial period, there being more pain and discharge than usual. Hæmorrhage may continue for a long time without pain, and treatment may sometimes arrest it without the supervention of uterine action at all; but when once this has been fairly established, it is difficult, if not impossible, to prevent expulsion. "When pain comes on at regular intervals, with hardness of the uterus and dilatation of its mouth, this is a serious symptom, for it shows that the uterus will no longer retain its contents, but is preparing to expel them" (*Rigby*). Pain may occur from the very first without bleeding, and separation of the ovum may take place high up at the fundus; blood is then effused between the uterus and ovum, and this may go on to a mischievous extent. The danger in these cases is generally greater than when separation occurs near the os, as, there being no escape for the blood, the uterus is thereby excited to action. "Separation at or near the os uteri will not be so dangerous, and in all probability there will be hæmorrhage without pain, which is the contrary when it takes place near the fundus" (*Dewees*).

In regard to *Diagnosis*, there cannot be much difficulty if it be clearly understood that pregnancy exists, and this must be determined by the signs already given. Of the two chief symptoms, hæmorrhage and pain, the latter is by far the most important, provided that it is really pain due to uterine action; to determine this point a vaginal examination is necessary. If the pain be due to uterine action, we shall observe that its effect upon the cervix is very marked in the sense of making it alternately tense and relaxed. We shall observe, also, that during the pain the membranes are protruded and tense; but after it they relax again, and the cervix becomes soft. If these symptoms occur there is little further hope of arresting the expulsion.

The *Prognosis* must depend on the period of pregnancy, the condition of the patient, the amount of hæmorrhage, and to some extent on the cause of the abortion. As a rule, the earlier it occurs the smaller the risk, though this is by no means without exception; for sometimes an ovum of only a few weeks will cause such an amount of hæmorrhage as will seriously endanger the patient's life. Ordinarily, it is the hæmorrhage which occasions the greatest anxiety; and it should always be remembered that until every portion of the ovular membranes is expelled a continuance of the hæmorrhage is almost certain. Moreover, there are other dangers connected with abortions, especially when they are of frequent occurrence, for they generally lead to chronic inflammation and hypertrophy of the uterus, to a relaxed condition of its fibre, and to a congested state of its mucous membrane, occasioning a variety of disorders in connection with the menstrual function, which may ultimately undermine the patient's health.

The *Treatment* of abortion may be considered under two heads —that which aims at preventing expulsion; and that to be adopted when all hope of saving the embryo is gone. The question may generally be determined by discovering whether there is, or has been, any pain; for, as has already been stated, pain and uterine action are synonymous terms, and it is doubtful whether there be any means of arresting uterine action when once it has fairly commenced. Dr. Tanner believed that it is quite possible to arrest this action by the aid of opium. He says: "I have known it act efficiently even when the os uteri has been so dilated as to admit the finger and allow of the membranes being touched." I must confess that I have never been so successful, but I have seen many cases where I had reason to suppose premature labor had begun, where there was strong uterine action, and where the membranes could plainly be reached through a dilated os; yet all passed off, and the patient went on to full time *without the administration of any drug whatever.*

It need hardly be said that where, by auscultation or other means, certain evidence is obtained that the fœtus is dead, no attempt need be made to prevent its discharge; on the contrary, our aim now should be to effect its removal as speedily as possible.

Usually the first indication of a threatened abortion is a discharge of blood, more or less profuse, from the vagina, which may or may not be accompanied by pain: the former generally leads to the latter, and hence our first care is to arrest the discharge. With this object in view, perfect rest and quiet in the recumbent posture must be enjoined. The patient should be kept cool, on a hard bed; excitement of every kind removed, and stimulants of all sorts should be eschewed. If there be any disposition to plethora, blood may be taken from the arm; this sometimes produces a very soothing effect: on the other hand, when general debility is the predisposing cause of the threatened expulsion, light but nutritious food is required; occasionally wine will be found of service.

Various medicaments are recommended for arresting the discharge. Dr. Churchill has found great benefit from the tincture of Indian hemp (Dub. Phar.), in doses of five or six drops, every two, four, or six hours; others have recommended the tincture of digitalis; while numerous astringents have been tried and found useful; of these, gallic acid, sulphuric acid, acetate of lead, with dilute acetic acid—it is very important to add this acid, as it prevents decomposition of the lead-salt in the stomach—and iron-alum, are the chief favorites. Opium is another most valuable medicine, especially in the form of liq. opii sedat., which is more soothing, less likely to disagree, and more efficacious than any other preparation: there is, perhaps, no single drug of such value as this. It should be given in full doses of twenty to thirty drops. In reference to this subject, it is of course all-important that we should be quite sure that an ovum occupies the cavity of the uterus and is threatened with expulsion, as in several diseased conditions of the uterus, both hæmorrhage and pain are common symptoms; the pain of abortion, however, differs in character from any other; it is at first of a peculiar dragging, bearing-down kind, and afterwards becomes regularly intermitting, just as in ordinary labor. But the chief difference is manifest on examination per vaginam; if it be a clot merely which occupies the uterine cavity, and can be felt at the os, we shall find that during a pain the mass does not become tense, nor descend lower, nor increase in size, as it would do if an ovum were there, and the membranes protruding; but the opposite to these conditions obtains in the absence of pregnancy. Where gestation has advanced sufficiently far we may also be able to distinguish some of the parts of the child.

With such treatment as the above we shall generally succeed, where the hæmorrhage is but slight, in preventing abortion; but other measures are necessary where the discharge is more profuse. If this occurs without pain and without any apparent attempt of the uterus to throw off its contents, we should not rest content with astringents only, for any attempt to check the hæmorrhage unless the uterus be emptied of its contents, will probably be futile, and uterine action is therefore the one method of cure. To secure this, cold should be applied to the external genitals and hypogastric region, and ergot may also be given. It will generally be found that so profuse a hæmorrhage destroys all hope of saving the embryo, there being a free separation of its structures from the uterus; under these circumstances ergot will be useful not only in arresting the bleeding, but also in exciting the uterus to throw off its contents; borax and cinnamon are recommended for the same purpose; meanwhile, for preventing the further escape of blood, and for dilating the os, the vagina should be plugged—some recommend a sponge, others a silk handkerchief, or two, or cotton-wool soaked in oil. The vagina requires to be gradually, carefully, but firmly filled, and the plug should be removed every five or six hours, or oftener, if thought necessary, until either expulsion of the ovum takes place, or the os is sufficiently dilated to admit the passage of the finger to extract it. The use of the plug, if not unjustifiable, is certainly a very questionable proceeding in any case after the emptying of the uterus, for hæmorrhage might go on even to a fatal issue into the cavity of the organ. Dr. Burns, of Philadelphia, speaks very highly of arsenic as a hæmostatic in these cases, given in doses of twenty minims of Fowler's solution, repeated at short intervals of half an hour until some decided effect is produced. It is obvious, however, that such doses require to be given with very great caution.

When there is an evident disclination on the part of the uterus to expel its contents, the parts being well dilated, and hæmorrhage continuing, it will be well, if ergot fails to excite action, to introduce one or two fingers into the uterus, and sweep out as it were the ovum from its cavity; or it may be extracted by means of a pair of small forceps, or by a hook, or, better still, by throwing up a stream of warm water through a syringe. It must be remembered, however, that the injecting of fluids into the uterine cavity is never absolutely, free from risk. I have seen severe, and in one case fatal, metro-peritonitis result entirely from this apparently simple proceeding. Great care should therefore be taken, first, that no particular force should be used with the injection, and secondly, that if the tube is inserted within the uterus great care should be taken that the os is sufficiently open to admit of easy egress of the injected fluid. When gestation has advanced as far as, or further than, the fifth month, much good may be done by puncturing the membranes; this checks the hæmorrhage and facilitates expulsion.

Much discussion has arisen as to whether it is allowable that a small portion of the ovular membranes or placenta may remain in the uterus; some believing that it would become putrid, be absorbed, and produce phlebitis and pyæmia, or rather septicæmia, while others think that no harm would result from its retention, and that it is better to leave it to be thrown off than to extract forcibly. My own experience favors the latter view, provided that the discharge be not excessive; but, at the same time, of course, if any unpleasant symptoms arise, I should at once endeavor, if possible, to remove any remaining fragments, and to wash out both vagina and uterus with warm water. One great danger of allowing any portion of the ovum to remain is in the continuance of the hæmorrhage. As a rule, when the uterus has been completely emptied of its contents, the hæmorrhage almost invariably ceases, while if any of the ovum remains, however small, the discharge is pretty certain to continue: we have thus a valuable point both for diagnosis and treatment. Cases are on record where a portion of placenta no bigger than a shilling has kept up a constant and profuse discharge of blood for several weeks, and ultimately caused the death of the patient. On the other hand, portions of considerable size will sometimes cause very slight inconvenience, and will gradually come away either *en masse* or in débris, without any detriment to the patient.

When all is expelled, the hæmorrhage soon ceases; but the patient should afterwards be kept very quiet and recumbent: in fact, she is to be treated very much as after an ordinary confinement. Tonics may be given if necessary, and chalybeates will often be of great service.

The *Prophylactic* or *Preventive Treatment* of abortion varies materially according to the condition of the patient. In one case, where there is a tendency to blood stasis, local depletion, with slight purgation by means of salines, will be the proper treatment; while in another, a generally supporting and tonic plan of treatment will be required; quietude should be enjoined, especially at the monthly periods; sexual intercourse forbidden; if there be undue excitement sedatives should be given. In regard to the kind of tonic which is most applicable, it may be well, perhaps, as a rule, to avoid chalybeates, as these are thought sometimes rather to encourage abortion than otherwise, and, should that occur, the practitioner may get blamed for it. At the same time, in cases of general atony, with anæmia, ferruginous preparations are undoubtedly of great service.

Dr. Tanner thought very highly of assafœtida "in the troublesome cases of repeated miscarriage occurring in weak and irritable women, in whom there is an absence of vascular congestion and any specific disease." This practice was recommended by Dr. Laferld, of Malta, acting upon the suggestion of Sydenham, that assafœtida acts as a tonic to the uterus: there are other drugs, also, which undoubtedly possess this property in a very high degree—ergot, for instance, and savin. With the latter I have had no experience, but with the former I have seen decidedly good results. The dose should be small, as, of course, we do not wish to produce any uterine contraction. I usually order ten minims of the liquid extract every four, six, or eight hours, and my plan is to give it for two or three weeks, at least, at about the time when the abortion is expected, from previous experience, to occur.

When there is reason to suspect syphilis as the cause of previous abortions, the bichloride of mercury will be found invaluable. Very often abortions recur in consequence of a tendency to disease in the placenta; in such cases our treatment is very empirical, and will probably not be very efficacious. Sir James Simpson suggested the propriety of giving salts containing a good deal of oxygen, such as the chlorate of potash; the death of the fœtus in these cases very much resembling ordinary suffocation, for the oxygenation of the blood which should take place in the placenta is now arrested by the disease.

Not unfrequently diseased conditions of the placenta destroy the child in the later months of gestation without inducing abortion; and where this has happened several times at a definite period in the same patient, the propriety of artificially inducing premature labor must be considered with the view of preserving the life of the child. If, however, in such a case death occurs earlier than the sixth or seventh month, the recognized period of viability, little benefit can be expected from this mode of proceeding.

PART III.

NATURAL PARTURITION.

CHAPTER I.

CLASSIFICATION OF LABORS AND MECHANISM OF PARTURITION.

HITHERTO the subject of pregnancy only, with a few of its complications, has received attention; and in the natural order of things, supposing gestation to have gone to full time, that which next claims consideration is the process by which the uterus is emptied of its contents, and the duty of the attendant during its performance under the various circumstances by which it may be surrounded; in other words, we have now to study the subject of *Labor*.

Of the immediate exciting *Cause of Labor* we know very little for certain. Earlier writers attributed it to the fœtus, supposing that it had the power of exciting uterine action so soon as it had arrived at full maturity; others attributed it to the uterus having arrived at the limit of distension; while others again thought that so long as the cervix remains undilated, or rather unobliterated, it is able to counteract the tonic contractions of the body of the organ, but so soon as, with the full development of pregnancy, this antagonism is overcome, then uterine action is definitely established and "labor" results. This, however, fails to explain the fact of expulsion during the earlier months of pregnancy. Again, some have thought that the occurrence of what but for conception would have been a menstrual period, with its attendant uterine irritation, was the immediate exciting cause. Sir James Simpson believed that it is due to a disintegrating process occurring in the decidua, and leading to a separation between it and the uterus, which process is sometimes imitated in the induction of premature labor by the operation of separating the membranes. Dr. Tyler Smith thought that "ovarian excitement is the law of parturition in all its forms of ova expulsion," but he did not tell us what is the cause of the ovarian excitement, or why the excitement which occurs at one particular period is more successful in inducing expulsion than that which preceded it in the previous months of gestation. We shall probably never get a much more correct or philosophical explanation than that which refers it to a *natural law*, similar to that which causes the shedding of ripe fruit.

Leaving, then, the cause of labor to be settled, if it can be, by some more rational explanation, it will be necessary, for the purpose of facilitating the study of practical midwifery, to adopt some *Classification of the Different Kinds of Labor.* Various systems have been proposed by different authors, but that which seems at once the simplest, and therefore the best, is to divide all forms of parturition into two great classes—namely, *Natural* and *Unnatural.* And here some explanation is necessary of the meaning which I attach to these two terms, the more so as, though all authorities agree in recognizing a *natural* division of labor, great diversity exists in the definition which is given to that term. Thus, by some, natural labor implies a head presentation with delivery in twenty-four hours by the natural efforts, and without complication; others have considered that the period of twenty-four hours is too long, and in the present day, when the employment of the forceps is being so much more frequently resorted to, natural labors of this kind will soon become rather the exception than the rule. Then again, as regards the presentation, some do not consider a head presentation as at all necessary to natural labor, but would include in this division also face and breech presentations. Thus Dr. Rigby wrote—"Natural presentations consist of two classes, those where the cephalic and those where the pelvic end of the child presents. In the first case it will be a presentation of the cranium or of the face; in the second, of the nates, knees, or feet."

It seems to me, however, preferable, following the example of Denman, Blundell, Ramsbotham, and others, to limit the term natural labor to head presentations only, and chiefly for the reasons that they give a less average mortality, are far more frequent than any other form of presentation, for "in 337,802 cases, the head presented 321,503 times, whereas breech presentations occur only one in 52⅓, and footling cases once in 90½ cases;" and, as a general rule, where the parts are otherwise natural, the labor is more easily and quickly terminated. But not only must the head be the presenting part, in order to constitute a natural labor, but the relations between the expelling power, the body to be expelled, and the passages through which it has to pass, must be such that the delivery of a living child with safety to the mother is the almost certain result.

I would not, however, fix any time within which a labor should be called natural, because I do not think that such an arbitrary rule would be of any service in practice; for supposing that in any given case the patient had gone beyond the time specified, the *rule* would seem to imply that something *ought* to be done to effect delivery, whereas the condition of the patient might be such that no interference would be either necessary or justifiable; the strength of the patient being good, an hour or two longer would suffice to accomplish delivery. On the other hand, it would be equally absurd, in a case in which it seemed for certain good and sufficient reasons desirable to interfere, that some fixed rule should, for the mere sake of the rule, deter the practitioner from such interference. The condition of the patient and the discretion of the practitioner must determine whether any given case shall be determined naturally or by artificial means, and no fixed rule as to time should have any weight in settling the question.

Hence, then, by the term natural labor is meant *Delivery of a living child by the natural efforts, without complication, and with the head presenting.* I have said a *living* child, but of course, if the child had died either previous to or during the labor, the death not being due directly to the labor, this would not affect the definition.

The second great division of labors, the *Unnatural,* would include all those not coming under the terms above-mentioned, and these also require to be studied, if possible, after some simple but intelligible plan. Accordingly, with this object in view, I shall consider in order all those labors which present some deviation from that which obtains in natural labor, in consequence of

1. An abnormal condition of the expelling powers.
2. An abnormal condition of the passages.
3. An abnormal condition of the child.

Under this last head will be considered—1, morbid states of the fœtal envelopes; 2, deformities and monstrosities of the child; 3, plural births; and 4, malpresentations.

Lastly, I shall treat of those labors to which the term *Complex* has been applied, those "which may be grouped together as a series of complications, without any necessary relation to the character of the labor." This division will include—

1. Retained placenta.
2. Hæmorrhage, accidental and unavoidable.
3. Puerperal convulsions.
4. Rupture of the uterus, bladder, perineum, etc.
5. Inversion of the uterus.

MECHANISM OF PARTURITION.

As a preliminary step in the study of practical midwifery, it is indispensably necessary thoroughly to comprehend the *Mechanism of Parturition*, and in the consideration of this subject we shall have to regard it in relation to—1, the expelling power; 2, the body to be expelled; and, 3, the parts through which it has to pass.

1. The *expelling power of labor* is of two kinds, voluntary and involuntary. The former is exerted by the abdominal and other muscles; the latter entirely by the uterus. It is, however, only in the early stage of labor that the action of the voluntary muscles can be strictly called voluntary, for when the passages are fully dilated and expulsion is being effected, it is almost impossible for the patient to prevent this action of the voluntary muscles. The whole effort then becomes one of reflex action, and, as such, is not by any means under the control of the will.

The involuntary or uterine muscular action is undoubtedly the prime agent in effecting delivery, and in order to appreciate it correctly, we must bear in mind the relation of the several layers of muscular fibres which make up, as it were, the substance of the uterus, together with the direction of the force which is exerted by them.

First, we have a broad layer of muscular fibres (*d*, *e*, Fig. 51) stretching from the round ligaments on either side (*a*, *a*) over the fundus uteri externally. These, in contracting, draw the uterus bodily down and fix it in the pelvis, and thus probably originate that feeling often spoken of by patients, and which is usually regarded as of favorable omen—viz., the lowering of the uterus (or the child) into the pelvis preparatory to the actual setting in of labor. At *f* is another band of fibres, which pass and spread over the posterior part of the broad ligaments.

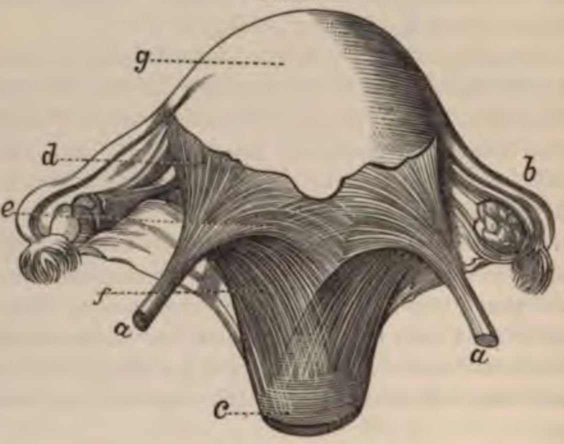
Secondly, we have an internal layer of fibres which is arranged chiefly in two directions, one set pass concentrically round the orifices of the Fallopian tubes, gradually enlarging as they proceed from the tubes, Fig. 43, page 89: the other set is arranged round the body of the uterus, but freely intermingles with those already described.

Lastly, we have a large mass of muscular fibres which interlace in all directions, but which, for the most part, pass horizontally, and more or less obliquely, round the uterus. They are seen in a slight degree round the cervix at *c*, Fig. 51.

Now, the action of the second set of muscular fibres above described must undoubtedly have the effect, if uniformly exerted, of pressing down upon any body within the cavity of the uterus, and so of favoring its expulsion; the action of the concentric fibres of the one side is met by the precisely similar action of the other side, and the combined effect is to force the body acted upon downwards in a direction midway between the two expelling forces; in other words, the resulting force is exercised in the direction of the os uteri. On the other hand, the set of fibres last described will, in their action, close round the fœtus, making the uterus more and more cylindrical, and by fixing it, as it were, will render more effectual the expulsive action of the other sets of fibres.

In regard to the composition of the cervix uteri, opinions are divided as to whether it contains muscular fibres or not: it seems obvious that if there be any, they must be arranged in a circular manner in a sphincter-like form; yet, Sir Charles Bell, writing on the "Muscularity of the Uterus," says, "I have not succeeded in discovering circular fibres in the os tincæ corresponding in place and office with the sphincters of the other hollow viscera, and I am therefore inclined to believe that, in the relaxation and opening of the orifice of the uterus, the change does not result from a relaxation of the muscular fibres surrounding the orifice. Indeed, it is not reasonable to conceive that the contents of the uterus are to be retained during the nine months of gestation by the action of a sphincter muscle. The loosening of the orifice, and the softening and relaxation which precedes labor, are quite unlike the yielding of a muscular ring. Now, though it may be true that circular fibres are not demonstrable in this situation, yet it seems clear that there must be muscular fibres of some kind, for there is no structural line of demarcation between the cervix and body of the uterus: the whole organ is, as it were, one muscle, and whatever be the arrangement of the individual fibres, the way in which the cervix contracts during uterine action, from a state of relaxation to a small circular ring, is at least strongly suggestive of a circular arrangement of fibres; and, in the absence of any demonstration to the contrary, it is fair to assume such a condition as is represented in the annexed figure (*c*, Fig. 51).

Fig. 51.



Under ordinary circumstances, uterine action presents the following peculiarities: It is always of an intermitting character; beginning first at the fundus, it extends downwards like a wave till it reaches the cervix uteri, when it returns again to the fundus, keeping the entire uterus for the time being in a state of firm contraction; after a time, varying in length in different individuals, and in the same individual at different periods of the labor, this action passes off and is followed by a period of perfect rest; this interval also varying in a similar manner. Simultaneously with this action, pain of a dull heavy character is experienced; it varies in amount according to the severity of the uterine action, the temperament of the patient, the previous habits of life, etc.; it is felt in the back and loins first, and gradually extends to the front; it differs in character with the stage of the labor: at first it is usually described as of a *cutting* or *grinding* character, afterwards it is said to become more *forcing* and with a *bearing-down* tendency. "The cause of the suffering is, first, the forcible distension of the cervix; next, the pressure of the fibres during contraction upon the nervous filaments; and, lastly, the dilatation of the passages."

In obstetric phraseology "*a pain*" is synonymous with uterine contraction. If we place the hand upon the uterus during this pain, we feel that it is hard, globular, with the fundus directed forwards; while the opposite obtains in the interval of ease. At first, owing to the action of the liquor amnii, which, being forced down by the contraction of the fundus, rebounds, as it were, upon the head of the child, the presenting part is pressed upwards away from the finger, and it only returns when the wave of contraction has again reached the fundus, and pressed down the child with increased force. Mental emotion will sometimes arrest this action for some time.

It may be added, in reference to this question of the order in which uterine action takes place, that opinions the very opposite of those which are here expressed are entertained by many authorities; indeed, in the first edition of this work I stated a contrary opinion to that now given. Subsequent experience, however, has led me to question my former statements in this respect, and I am fully satisfied, both by fact and reason, by experience as well as by theory, that the view here given is the correct one. On the other hand, the late Dr. Rigby, accepting fully the opinions of Wigand on this matter, declares that "the contractions of the uterus do not begin in the fundus, but in the os uteri, and pass from one to the other. Every pain which commences in the fundus is abnormal; and either arises from some derangement in the uterine action, or is sympathetic with some irritation not immediately connected with the uterus, as from colic, constipation, etc." Again, he says: "When a genuine pain comes on, so far from the head being pressed against the os uteri, it at first rises upwards, and sometimes gets even out of reach of the fingers, whilst the os uteri itself is filled with the bladder of membranes; if it had commenced in the fundus, instead of the inferior segment of the uterus, so far from the head being drawn up at the first coming on of the pain, it would have been forcibly pushed down against the os uteri."

Now, there are two fallacies in this argument, which it is desirable to expose. In the first place, it is not true to speak of "the head being drawn up:" no such action is effected, for the very good reason that there is no means by which it can be done; nor, on the other hand, is it correct to suppose that contraction of the cevix forces the head up. Paradoxical as it may at first sight appear, it is nevertheless true that the contraction of the fundus is, so long as the liquor amnii remains, the cause of the recession of the head from the cervix, and this is accomplished in obedience to the laws of hydrostatics, for as the fundus and body of the uterus contracts, the fluid is forced downwards, but by the laws of fluid-pressure it acts equally in all directions, and consequently by an upward reaction upon the child the head at first recedes somewhat, while the fluid descends.

Again, the other argument that the cervix uteri is first felt to contract, rests also upon a fallacy, for the tightness of the cervix which is felt as the first and immediate result of the pain of uterine action, is, in fact, evidence of previous action above, the contraction of the fundus giving rise to resistance and consequent rigidity on the part of the cervix.

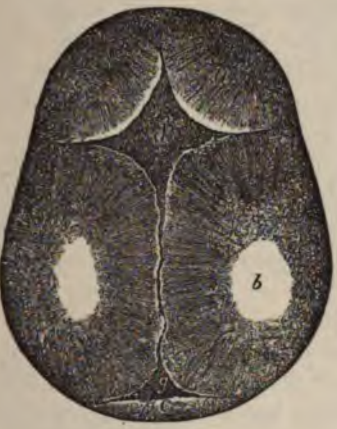
There is yet one other point which it is important to observe, viz., that when the uterus goes into a state of contraction, if one hand is placed over the fundus and another upon the cervix, we shall find, first, that the uterus at the top becomes firm and hard, and *soon after this* the cervix tightens up and becomes quite hard.

2. As regards *the influence of the body to be expelled*, none is exerted directly by the child itself; formerly it was considered that the child did exert some influence, but it is now well known that during parturition the child is, as regards its expulsion, quite inactive. Indirectly, however, through its cranial dimensions the progress of labor may be considerably modified. Hence it is important to know what those dimensions ordinarily are, and a brief description therefore of the fœtal head is here necessary.

In Fig. 52 the vault of the cranium is represented, and the following points are to be observed: *a* indicates the frontal bone of the right side; *b* the parietal bone, and this particular point represents the right parietal protuberance, which in most natural labors is also the presenting part; *c* is the occipital bone; *d* is the anterior, and *g* the posterior, fontanelle, the former being the part most readily distinguishable in the early stage of natural

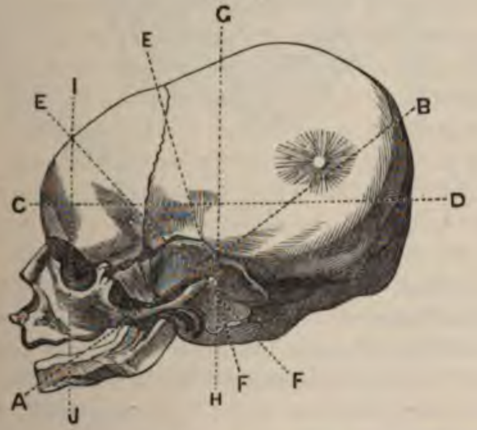
r. The dimensions of the fœtal head are as follows: The itudinal or occipito-frontal diameter of the head, measured, were, through the head, from the forehead to the occipital

Fig. 52.



berance, C, D, Fig. 53, varies from four to four and a half es; the transverse or biparietal diameter from three and a

Fig. 53.



to four inches; and the occipito-mental, which is taken from occipital protuberance to the chin, A, B, Fig. 53, five inches.

As a general rule the heads of male children are slightly larger than those of female children, and as a consequence there is a greater mortality among male than female children at birth. So also among women parturient with male children the maternal mortality slightly exceeds that with female children. This is owing to the greater frequency of complications, and to the greater length of the labors, but all arises from the fact stated above, viz., that male heads are slightly larger than female.

But besides the expulsion of the child, that of the placenta, membranes, and liquor amnii must also be included, and, as we shall see hereafter, when treating of the subject of unnatural labor from an abnormal condition of the child, which includes all these ovular structures, difficulties may arise from any one of them. At present, however, I am not concerned with these, but rather with their use in the mechanism of parturition; and it will be obvious that a very important use is served by the liquor amnii, for without it not only would labor be much more painful and tedious, but by the substitution of the hard head of the child for the soft cushiony bag of membranes, great liability to irritation and inflammation of the cervix would be incurred. Moreover, as the os dilates, the protruding bag of fluid comes to press upon its inner edge equally all round, and thus a dilating power is exercised in a way which could not be otherwise effected. The force exerted is, as it were, regulated and equalized by fluid pressure according to the laws which govern hydrostatics, the chief of which is that pressure is exerted equally in all directions; it is this which gives such value to the presence of the liquor amnii.

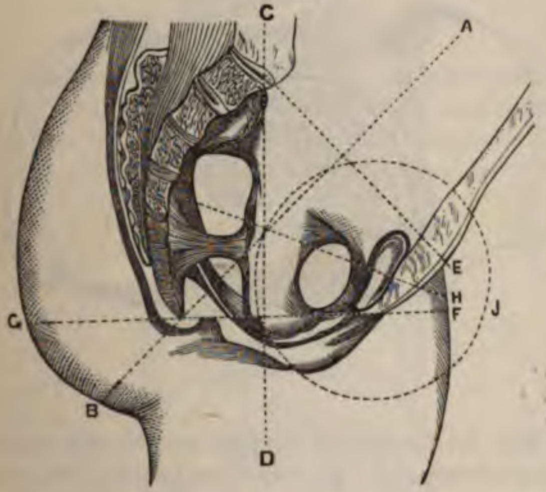
3. In reference to the *parts through which the child passes*, the most important facts to remember are the *diameters* at different parts of the pelvis, the brim, cavity, and outlet; and it will be seen by the following figures that the shortest diameter at the brim becomes the longest at the outlet, and, *vice versa*, the longest at the brim is the shortest at the outlet: all this has reference to the altered position of the head at the several parts, and its relations to the various diameters, the law being that the long diameter of the head shall always correspond with the long diameter of the pelvis. At the brim, the longest pelvic diameter is the transverse, therefore the long diameter of the head engages this part of the pelvis, while its shortest diameter—the transverse—is opposed to the shortest pelvic diameter, which is here the conjugate; and so on throughout its further passage down the pelvic canal.

The following represent pretty accurately the several pelvic dimensions:

At the *brim*,	the antero-posterior diameter	is	4¼ in.
" "	the transverse	"	5¼ in.
" "	the oblique	"	4¾ in.
At the *cavity*,	the antero-posterior	"	4⅔ in.
" "	the transverse	"	4⅓ in.
At the *outlet*,	the antero-posterior	"	5 in.
" "	the transverse	"	4¼ in.

The variation in the *axes* of these several parts must also be remembered; that of the brim is directed downwards and backwards (A, B, Fig. 54), while that of the outlet is directed downwards and forwards, as is represented in the annexed illustration.

FIG. 54.



As the child descends the diameters of the head should, of course, accord with those of the pelvis, and the direction it takes should vary with the altered axis in different parts. Furthermore, the long axis of the body of the child should correspond with that of the uterus.

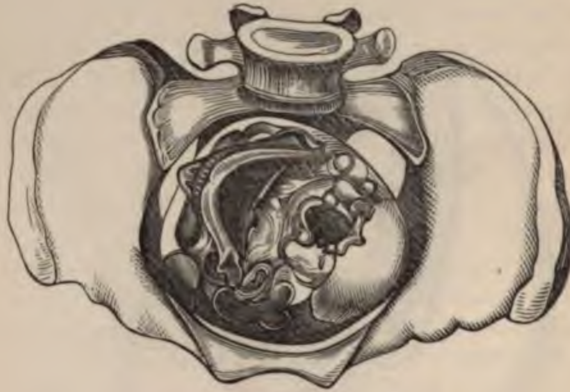
The obstacles to the easy passage of the child in natural labor are, first, the undilated cervix uteri; second, the bony walls of the pelvis; third, the muscles, ligaments, and other structures situated at the pelvic outlet; and lastly, the perineum and external genitals.

These conditions are always present, though under various modifications, in all kinds of labor, and it is necessary to bear them in mind in studying the mechanism of parturition, no matter what the presenting part may be. For the present, however, all that is intended to be considered in this chapter is the mechanism of labor *in cranial presentations*, that of the other presentations will be noticed in a subsequent chapter.

There are certainly two, possibly four, head presentations, which may be thus described:

The *first position* (Fig. 55) is that in which the long diameter of the head corresponds with the *right oblique diameter* of the pelvis, and in which the forehead is directed towards the right sacro-iliac synchondrosis, and the occiput towards the left obturator foramen.

FIG. 55.

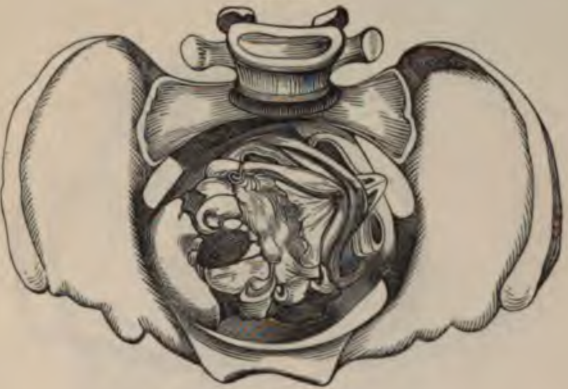


First position.

The *second position* (Fig. 56) is that in which the long diameter of the head corresponds with the *left oblique diameter* of the pelvis; in this case the forehead is directed towards the left sacro-iliac synchondrosis and the occiput towards the right foramen ovale.

In the *third* and *fourth positions* the same diameters of the head and pelvis correspond: that is to say, in the third position the long diameter of the head corresponds with the right oblique diameter of the pelvis, just as in the first position; while in the fourth position, the long diameter of the head occupies the left

FIG. 56.

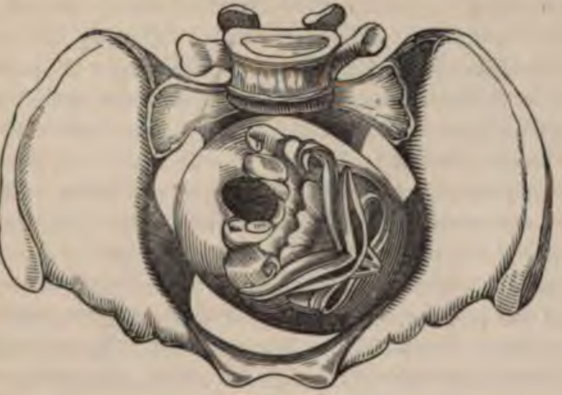


Second position.

oblique diameter of the pelvis, just as in the second position; but the os frontis has now changed places with the occiput, and looks towards either the left or the right obturator foramen.

In the third position (Fig. 57), the long diameter of the head

FIG. 57.

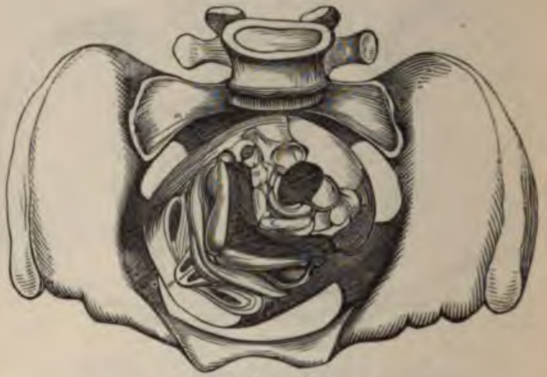


Third position.

corresponds with the right oblique diameter of the pelvis, and constitutes what is called the *third cranial position*.

In the fourth position, on the contrary, the long diameter of the head corresponds with the left oblique diameter of the pelvis, and thus forms the *fourth cranial presentation.*

FIG. 58.

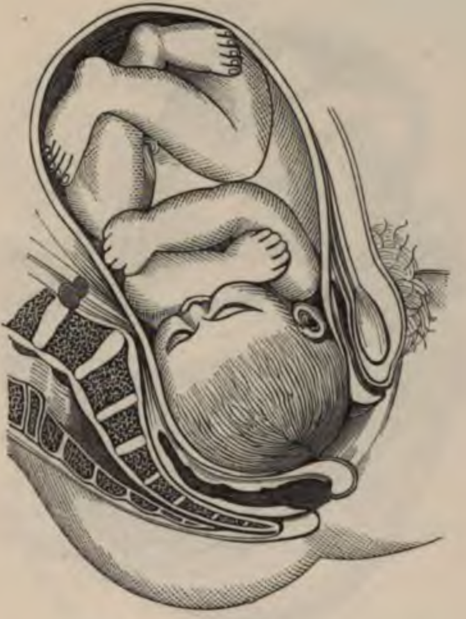


Fourth position.

These several positions may now be considered more in detail.

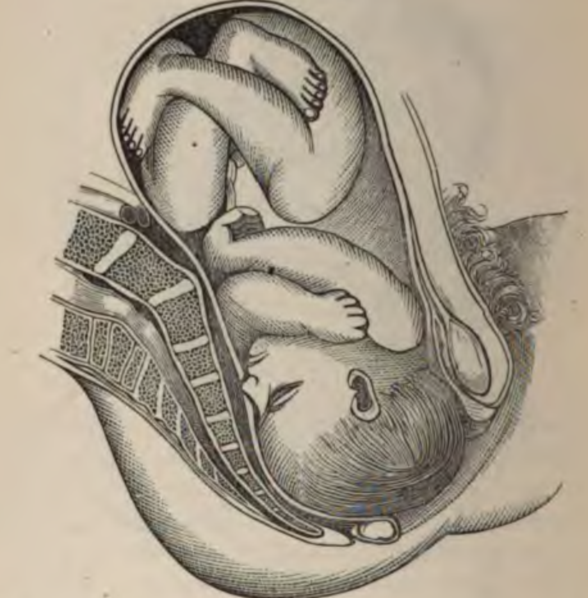
First cranial position (Fig. 59).—Supposing that labor is sufficiently far advanced to justify an examination, we shall find, on introducing the finger within the os uteri, that we come first upon the right parietal protuberance with the biparietal or sagittal suture running in the direction indicated above, *obliquely* across the pelvis in the right oblique diameter; following this with the finger forwards and to the left side, we come upon the junction of the two lambdoidal sutures forming the posterior occipital fontanelle, and still more forward is felt the occiput itself close to the left obturator foramen; backwards and to the right we come upon the square open space of the anterior fontanelle. The right parietal eminence is slightly the lowest in the pelvis, and will probably, as I have said, be the first part touched by the examining finger: should the examination be made before the head has reached this position, we shall find that its long diameter is situate more transversely, and in that position it first engages the pelvic brim, with the right parietal bone still depending. Occasionally, if the os uteri be sufficiently dilated, we can feel the right ear just behind, and a little to the right of the symphysis pubis—this, however, is extremely rare. The sagittal suture will at the same time be felt running obliquely across the pelvis from the right sacro-iliac synchondrosis to left obturator foramen: at its anterior extremity (that is, behind and to the right of the pelvis) will be found the large lozenge-shaped anterior fontanelle; while, at its posterior end (that is, in front and to the left of the pelvis) the small posterior triangular fontanelle will be felt.

FIG. 59.



As the head descends the dependence of the one parietal bone becomes less and less, though it never quite loses its obliquity to the planes of the pelvis; concurrently the long diameter of the head gradually approaches more and more to the antero-posterior or conjugate diameter of the pelvis, as the upper and posterior part of the right parietal bone emerges under the pubic arch and engages the external parts. During the descent of the head, the chin is more and more depressed or flexed upon the sternum (as is seen in Fig. 60), while the occiput is, as it were, pointed downwards into the pelvic cavity (Fig. 60). As soon as this part has projected beyond the vulva, and has emerged from under the pubic arch (Fig. 61), the chin is freed from the sternum, the face occupies the hollow of the sacrum, the head, as it were, describing a portion of a circle, in which the occiput is for the most part fixed, while the face sweeps along the concavity of the sacrum on to and over the perineum. Over the situation of the presenting parietal protuberance will generally be felt, if the child be living, a soft swelling, the caput succedaneum. According to Naegele it may be stated, as a general rule, that in all cases of cranial presentations "the head enters, passes through, and emerges from the pelvis obliquely; and this is the case not only as to its transverse diameter, but also as to the axis of the brim; the side of the head being always lowest or deepest in the pelvis."

FIG. 60.



At birth the face of the child looks backwards and slightly upwards to the right thigh of the mother, the shoulders being now at the brim of the pelvis in the opposite oblique diameter to that originally occupied by the head, the right shoulder being forwards and lowest is that which is first born.

Fig. 59 represents the child in the first cranial position, the head occupying the right oblique diameter, and in the drawing it is represented as having descended nearly to the floor of the pelvic cavity.

In Fig. 60 the child has descended somewhat lower, and the head has therefore changed its oblique or diagonal position to one directly antero-posterior—the conjugate. The occiput is now at the symphysis pubis, and the face occupies the hollow of the sacrum. The transverse diameter of the head is in the transverse diameter of the pelvis; its long diameter is nearly parallel with the axis of the pelvic outlet. The body of the child is but slightly altered in its relations.

FIG. 61.

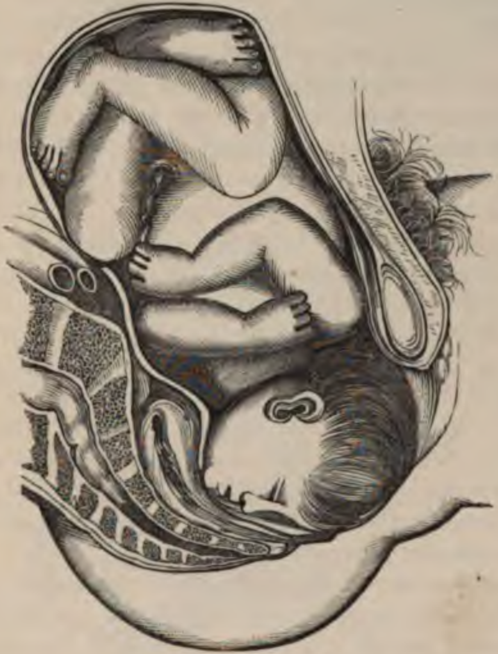


Fig. 61 represents a yet further stage of the same presentation. The head is now being extruded, as it were, and is slightly revolving on its transverse axis, the chin being still further separated from the chest, as the occiput emerges under the pubic arch, while the face sweeps over the hollow of the sacrum, the coccyx, and perineum. Finally, the head is expelled altogether, and then a slight rotation is made, so that the head comes to occupy a position similar to that which it had on entering the pelvic brim; that is to say, the forehead looks to the inner and posterior surface of the right thigh of the mother, while the occiput is turned to the opposite direction. The body of the child has also made a slight turn from the oblique to the antero-posterior diameter of the pelvis, so that the right shoulder is opposed to the symphysis pubis, and the left to the hollow of the sacrum. In this position its further descent is effected until the completion of the birth.

Thus it will be seen that four distinct movements are effected by the head in its passage through the pelvis. There is, first, the movement of *flexion* by which the head is flexed upon the trunk, the chin being approximated to the chest. This movement is made in the following manner: The force of uterine contraction is transmitted through the trunk of the child along its spinal column to the posterior part of the head of the child, and as the head is not joined on to the trunk exactly in the centre of the base of the skull, but rather to the posterior part of it, it follows that the anterior part of the head becomes, as it were, the long arm of the lever, and is therefore freer to move, so that the transmission of the uterine force to the head being met by resistance, the long arm of the lever moves, and the head becomes flexed upon the chest. The effect and purpose of this movement is to shorten the long diameter of the head, and so to enable it to enter the pelvic cavity, and unless this movement is effected, considerable difficulty is experienced.

The second movement is one of *semi-rotation* and is caused by the gliding of the occiput over one or other of the ischial planes, being directed thereto by the ischial ridge; if the occiput goes over the anterior ischial plane, then the forehead goes towards the hollow of the sacrum, and thus the head comes to occupy the antero-posterior diameter, which secures that the long diameter of the head shall engage the long diameter of the pelvis in its further progress towards delivery; that, in fact, is the object of this second movement.

The third movement is one of *extension* by means of which the chin is removed from the chest and the occipital part of the head is expelled from the external parts. This movement is effected at the time the head reaches the floor of the pelvis and rests upon the perineum. The occiput now presents at the vulvar orifice, and the subpubic arch becomes, as it were, a fulcrum round which the occiput turns. The object of this movement is the extrusion of the head from the pelvic outlet, and it is the resultant of the expelling force of the uterus, and the resistance of the perineum, the outlet representing the diagonal of these two.

The last movement is one of *restitution,* and takes place after the delivery of the head. By it the head rotates slightly, so that the face looks upwards to the right thigh of the mother; in fact, it is restored, hence its name, to exactly the same relative position as regards the mother that it had when it began its course through the pelvis, the object being to bring the shoulders into the antero-posterior diameter of the pelvis at the outlet.

All these four movements are intended to be represented in the diagram, Fig. 62, which shows also the positions which the head assumes in its passage through the pelvis: first, at the brim it is in the right oblique diameter; then it becomes more flexed on the chest, and more antero-posteriorly; then it extends from the chest, and is directly in the conjugate diameter; then the vertex emerges from under the pelvis; and finally, it rotates slightly so that the face looks towards the mother's right thigh.

FIG. 62.

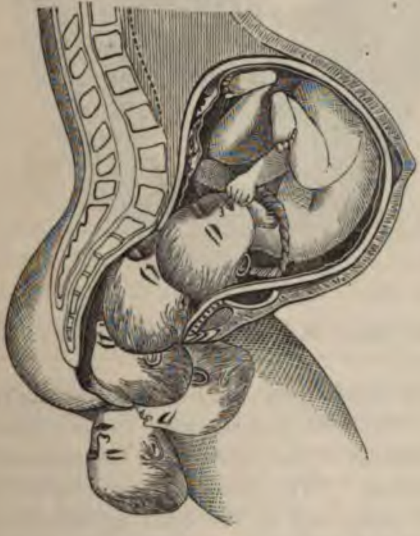
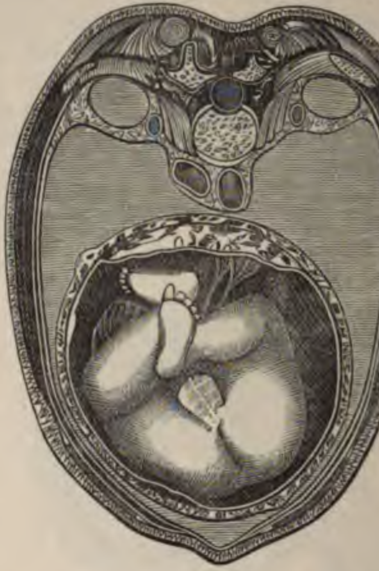


Fig. 63 represents a transverse section of the uterus and abdomen to show the position of the trunk and lower extremities of the child in the first cranial position, wherein it can readily be imagined that the head would occupy the right oblique diameter of the pelvis. The placenta is here seen attached to the posterior wall of the uterus; it may be doubted whether this is a usual

FIG. 63.



position. Both these last diagrams are taken from Schulze's plates.

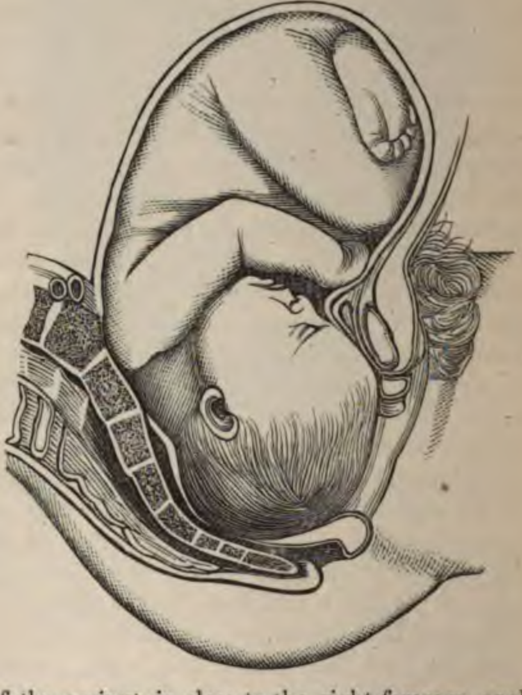
In the *Second cranial position* (Fig. 56), just the reverse of all this obtains. The head presents with its long diameter in the left oblique diameter of the pelvis: the *left* parietal bone is now the most depending. "The posterior fontanelle is directed to the right foramen ovale, and as the head approaches nearer and nearer to the inferior aperture, it is the posterior and superior quarter of the *left* parietal bone which is felt in the cavity of the pelvis opposite to the pubic arch; so that when the point of the finger is introduced under and almost perpendicular to the symphysis pubis, it touches nearly the middle of the posterior and superior quarter of the *left* parietal bone; and this is precisely the part, as the head advances further, which first distends the labia, with which the head first enters the external passages, and the spot upon which the swelling of the integuments forms itself" (*Naegele*). This remarkable change in the position of the head during the progress of the labor takes place by a screw-like movement, the passing from the right oblique into the transverse, and finally into the left oblique diameter, which is that in which it is said really to present; the subsequent movements of the head are in the main *mutatis mutandis* precisely the same as those which occur in the first cranial position.

In the *Third cranial position* (Fig. 57) the long diameter of the head occupies the right oblique diameter of the pelvis, just the same as in the first cranial position, except that now the forehead, instead of the occiput, is directed to the left obturator foramen, the occiput, instead of the forehead, to the right sacro-iliac synchondrosis. The sagittal suture will be in the same direction as in the first position, but the anterior and posterior fontanelles will have changed places, the former being forwards and to the left, the latter backwards and to the right. The left parietal bone is the one first felt, its protuberance presenting. As labor progresses one of two courses may be followed, either the posterior part of the head descends most, in which case the forehead will come more towards the symphysis pubis, while the occiput engages the hollow of the sacrum, thus occupying the antero-posterior or conjugate diameter of the pelvis (Fig. 64), or the head may make a partial rotation, first with the long diameter of the head into the transverse diameter of the pelvis, and finally into the left oblique diameter, as was described just now in the account of the second cranial presentation; the posterior fontanelle will be near to the right foramen ovale, the anterior near to the left sacro-iliac synchondrosis. The one or the other of these two movements seems to depend upon the degree of flexion which the head attains; if the chin is well flexed on the chest, the long diameter of the head is shortened, greater freedom of movement is allowed, and the head then rotates first to the transverse and then into the left oblique diameter. On the other hand, if flexion is imperfectly performed the head is driven down, and only sufficient movement is permitted to place the long diameter of the head in the corresponding long diameter of the pelvis, viz., the antero-posterior of the outlet. As the head descends, it gets more and more with its long diameter in the antero-posterior diameter of the pelvis, the face occupying the hollow of the sacrum, the occiput emerging under the symphysis pubis. As the latter is born the chin again separates more and more from the chest; the head, in fact, revolves as it were upon an imaginary transverse axis, and the face sweeps over the sacrum, coccyx, and perineum.

If, on the other hand, the head is born with the forehead anteriorly and the occiput posteriorly, the forehead will first appear under the pubic arch, and will be followed by the eyes, nose, mouth, and chin.

The *Fourth cranial position* (Fig. 64) is the converse of the second—that is to say, the long diameter of the head occupies the left oblique diameter of the pelvis, but here the forehead, instead of the occiput, is close to the right foramen ovale, while the occiput, instead of the forehead, is directed to the left sacro-iliac synchondrosis; the anterior fontanelle is directed to the former, the posterior to the latter. The right parietal bone is here again the presenting part, but its anterior, instead of its posterior angle is the point first reached. Here, again, too, as in the last, the head in its further progress may take one of two directions—either the forehead may sweep round first to the transverse and then to the right oblique diameter of the pelvis, in which case it is converted from the fourth to the first position, passing through its subsequent stages exactly as in the latter

FIG. 64.

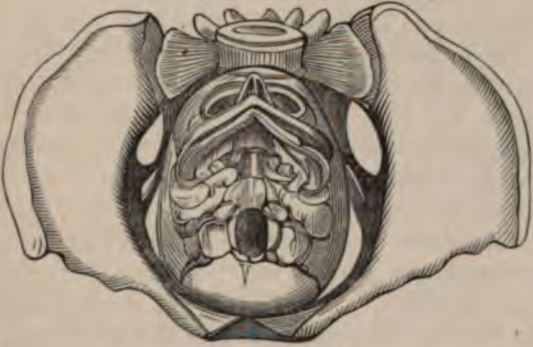


case; or, the occiput may sweep round from the left sacro-iliac synchondrosis to the hollow of the sacrum; while the forehead is directed to the symphysis pubis, and emerges under the pubic arch. The former is, however, as in the case of the third position, the more common.

It used to be commonly considered that in the third and fourth presentations the forehead was always born under the arch of the pubis; "but now that which has been considered as a regular phenomenon is a deviation, and exactly that which has been esteemed a deviation from the usual course and rule is perfectly regular."

In the four cranial positions, above described, the long diameter of the head in all cases engages the pelvic brim in one or other of its oblique diameters, hence they are called the *Four Oblique Cranial* presentations. But besides these, there are described yet four other head positions, in each of which the head occupies one or other of the *direct* diameters, and they are therefore termed the *Four Direct Cranial* presentations. Two of these are represented in the annexed illustrations (Figs. 65, 66), in which the long diameter of the head occupies the antero-posterior or conjugate diameter of the pelvis; the frontal bone being in the one case posteriorly, in the other anteriorly, the occiput being at the same time in the directly opposite position.

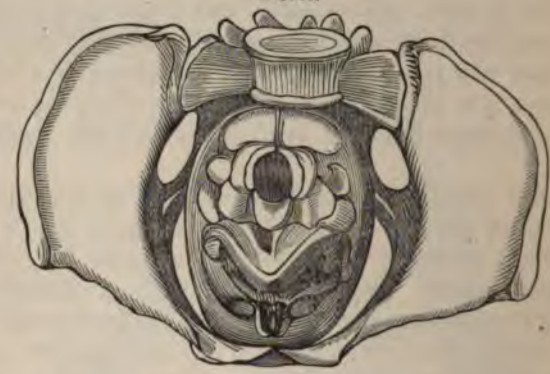
FIG. 65.



The two remaining *direct* cranial presentations are those in which the long diameter of the head occupies the transverse diameter of the pelvis, the frontal bone being directed towards either the one or the other of the iliac fossæ, and the occiput is in the opposite side.

It is doubtful, however, whether either of the two latter can fairly be considered as true cranial presentations, for it is more than probable that when the longitudinal suture is found in the position described, the head is at that moment undergoing a

FIG. 66.



change from one oblique position to another—that, in fact, the situation is merely transitional; at any rate, whether or no the head be then changing from one oblique position to another, it is certain that all direct transverse presentations do, in their further course, become oblique, and follow that route to the end, whether it be in the first, second, third, or fourth positions.

In regard to the *Cause* of head presentations though it is a subject which has often been discussed, it has never yet been satisfactorily determined; some thought it due to gravitation, the head being the heaviest part of the child's body; others ascribed it to the fœtal instinct; others to the mode in which the uterus is developed in the latter weeks; while Sir James Simpson regarded it as a vital and not a physical act, "concurring with its life, but being lost by its death." The character of the movement which places the fœtus in that position, he regarded as reflex or excito-motor; and he showed how this position is best adapted to the normal fully developed uterine cavity. "This adaptive position of the contained body to the containing cavity is the aggregate result of reflex or excito-motory movements on the part of the fœtus, by which it keeps its cutaneous surface withdrawn, as far as possible, from the causes of irritation that may act upon it as excitants, or that happen to restrain its freedom of position or of motion."

CHAPTER II.

PHENOMENA OF NATURAL LABOR.

THERE are generally certain *Premonitory Symptoms* of the approach of labor which it is convenient to remember, as they sometimes afford indications of its character. They are useful also as giving a warning to both the patient and the practitioner. They are, 1. An alteration in the position and form of the abdominal tumor. 2. Irritability of the bladder and rectum. 3. Contractions of the uterus unattended by pain. 4. Relaxation of the vagina, with slight mucous discharge occasionally tinged with blood. 5. Mental anxiety. These signs are placed in the order of their occurrence. And a few words upon each of them may not be out of place here.

Generally about the middle of the last month of gestation, the patient notices that she feels lighter and more confortable, that her breathing is easier, and that she can move about more freely, her dress is looser, and she is conscious that the womb, or at least the child, has sunk lower in the pelvis; such is actually the fact. The fundus uteri is found to have descended from the ensiform cartilage to nearly midway between it and the umbilicus; it has also fallen somewhat more forward. This is generally regarded as a favorable sign, especially in primiparæ, as it indicates a tolerably roomy pelvis.

Sometimes the patient is able to pass water more freely; but generally, owing to the pressure of the uterus upon the neck of the bladder, there is a much more frequent call to pass water, with increased difficulty in voiding it. The same also happens with regard to the bowels; they are occasionally very irritable, and there is frequent desire to evacuate them, though it may be only a little watery or slimy matter is passed. At the same time we should remember that the passing of a small quantity of fluid fæces is in reality no proof that the bowels are properly relieved, for I have known patients often suffer from considerable accumulation and much consequent distress in whom there has been daily action of the bowels. Where proper relief is not obtained, the patient will not only suffer a good deal from a kind of spurious uterine action, but the fecal accumulation in the lower bowel will prove a direct cause of delay, if not of difficulty, and will certainly be a source of much discomfort in the progress of delivery.

Some patients experience a good deal of pain of an irregular, more or less spasmodic, character during the last week or two of gestation; it is especially liable to come on at night-time, is often associated with disordered bowels, and is sometimes relieved by a gentle purge; in this way what are called "spurious pains" are produced. Unlike these are those uterine contractions occurring during the last month and common in the last week of utero-gestation, which, though not distinctly painful, perhaps, are yet productive of some discomfort, giving rise to a feeling of tight pressure as if from cramp. During this action, if the hand be placed upon the abdomen, the uterus will be found very firm and hard.

But what is called in the phraseology of the lying-in room a "show," is of more certain value as a sign of approaching labor than any of the above. This consists of a slight discharge of mucus from the vagina, which is also faintly tinged with blood; its source is probably from the rupture of a few small vessels about the cervix, due to commencing dilatation and separation of the membranes of that part. It generally begins shortly before labor commences, and varies both in quantity and quality; but is generally at first colorless, and as labor approaches it gets darker. Coincident with this discharge, and in proportion to it, the soft parts become moist, relaxed, spongy, and dilatable.

When all this has happened, labor may be said to have fairly begun, and in ordinary or natural cases the following phenomena will probably be present: for the sake of convenience, they may be grouped into three stages, corresponding with the three stages of labor. The first group includes those phenomena which are coincident with the full dilatation of the passages, uterus, and vagina, and with the entrance of the head into the latter; the second group comprises all the phenomena which are connected with the birth of the child; and the third group corresponds with the expulsion of the placenta and membranes.

First Stage of Labor.—Pain, as the result of uterine contraction, is the most prominent feature of labor, and its occurrence assures the patient that parturition has actually begun. The character of these "pains" has already been described. When they first begin they are comparatively slight, having an interval of, it may be, a quarter or half an hour or more; they gradually, however, get more and more frequent, more severe, and are of longer duration; they are felt most severely in the back and loins, are of a dull, heavy, and prolonged character, and have regular periods of remission and exacerbation; moreover, there are certain differences in these pains, which are peculiar to and to some extent an indication of the different stages of labor. So marked are these sometimes that the experienced practitioner will often be able to tell by the way the patient bears her pain how far the labor has progressed. In the first stage they are of a "cutting" or "grinding" character, and are shorter, more painful, and less easily borne than those of the next stage; they mostly begin in the back, and reach round to the abdomen, but they do not evoke any voluntary expulsive efforts. These pains are indicative of dilatation of the os; as labor advances the pain becomes heavier, longer, and of a strongly expulsive character, which the patient is utterly unable to control; if on her feet, she is obliged to stand still, to hold her breath, and to bear down with all her might.

Contrary to what might be expected, the thinner the os uteri the more painful and tedious will be the process of dilatation; while, on the other hand, the thick, soft, spongy os is always the readiest to dilate. The process of dilatation of the os is due, according to the late Dr. Rigby, not merely to the mechanical stretching which the pressure of the membranes and the presenting part exerts upon it, but also in consequence of its circular fibres being no longer able to maintain that state of contraction which they had preserved during pregnancy; they are overpowered by the longitudinal fibres of the uterus, which, by their contractions, pull open the os uteri in every direction.

Vomiting often occurs during this stage, and is generally a good sign, as indicating dilatation of the os. It must not of course be confounded with that peculiar coffee-grounds vomit, which is one of the signs of exhaustion. There is often much mental inquietude at this stage of labor; the patient is fidgety and restless, sometimes desponding; but all this usually disappears as the first passes into the second stage. Very frequently, as the os uteri is fully dilated, and the head passing through, severe rigors will come on; the teeth chatter, the patient complains of being cold, though the surface may really be hot all the while.

If the pulse be examined during a pain, it will be found, according to Hohl, to increase in frequency just when each pain commences, and it rises and attains its maximum with it. As the pain subsides, so the pulse gradually resumes the rate which it had during the intervals. A similar ebb and flow may also be heard in the character and extent of the uterine souffle when the ear is applied to the abdomen with the stethoscope; this sound becomes stronger and louder as the pain comes on, and is preceded by a short, rushing sound. "Other tones, which have not been heard before, and which are of a piping, resonant character, now become audible, and seem to vibrate through the stethoscope, like the sound of a string which has been struck and drawn tighter while in the act of vibrating" (*Hohl*).

The effect on the uterus during "a pain" will be felt by placing the hand over the abdomen; it will be found hard and tense, and the fundus will have come more forward, so that the long axis of the uterus will be brought more and more into conformity with the axis of the pelvic brim. At the same time, the os will be found to have become tight and circular, while the membranes protrude through and are firmly grasped by it. As the pain or uterine action passes off, all this becomes relaxed again, the patient's suffering ceases for the time, and she possibly dozes in the interval before the next pain. True uterine action always begins, according to Wigand, in the cervix, and proceeds upwards towards the fundus; he says that "every pain which commences in the fundus is abnormal, and either arises from some derangement in the uterine action, or is sympathetic with some irritation not immediately connected with the uterus, as from colic, constipation, etc." But in direct opposition to all this, I have before stated my conviction, derived from direct clinical observation, that uterine action commences in the fundus, and spreads downwards to the cervix. On this point I entirely agree with Professor Lazarewitch, who, upon the truth of it, has initiated a new method for the induction of premature labor, which I shall hereafter describe, and the great success of which in his hands seems fairly attributable to its being a more accurate rendering of the natural process.

This state of things, constituting the chief phenomena of the first stage of labor, may go on for a variable period until the os uteri is fully dilated. The exact condition of the parts is, of course, only to be determined by a vaginal examination. At first the os is found to be high up, near the sacrum in primiparæ, but near the pubis in multiparæ; the degree of dilatation will of course vary according to circumstances; the parts are at first cool, dry, or moist, but they soon become hotter, moister, more flaccid, and more dilatable.

"As a general rule, we may state that regular and genuine contractions of the uterus sufficiently powerful to produce pain, seldom require more than six hours to effect the full dilatation of the os uteri; in many cases a much shorter time will be sufficient, whereas, in others, the first stage of labor may last for more than quadruple this period before it is completed; in neither can it be considered as abnormal; and we usually find that where the pains of the first stage have been slow and lingering, they become remarkably quick and active during the second stage" (*Rigby*).

Second Stage of Labor.—As soon as this stage commences a marked change takes place, which is observable chiefly in the character of the pains and the way they are borne by the patient. The membranes may or may not have ruptured, but, as a general rule, they do so at the full dilatation of the os uteri, if not before; with this and the escape of the liquor amnii, the patient feels greatly relieved, she breathes more easily, the child sinks somewhat lower, and this is frequently followed for a time by a lull in the uterine action. Soon, however, the uterus seems to redouble its efforts, the pains are longer, the intervals between them are shorter, and they are now of a forcing or *bearing-down* character, attended by voluntary, or rather, perhaps, involuntary, expulsive efforts on the part of the patient. Though there is actually more suffering, the patient shows it less from her attention being necessarily directed to these expulsive efforts; for this purpose she holds her breath, and generally pulls at something, so as to bring all the muscles of the extremities and trunk to aid her in that purpose. Her face becomes congested with the effort and the arrested respiration, and sometimes evil consequences have ensued from it. In the interval between the pains the breathing is quick, the voice is thick and hoarse, and the expression of the patient's face is one of great excitement and exertion. All this, but especially the quasi-voluntary efforts to expel the child, is certain evidence that the labor has entered upon the second stage. "We never see the really powerful straining pains come on (the head may be never so low in the pelvis) so long as the os uteri is not fully dilated" (*Wigand*).

The cause of all this straining is probably the sympathetic connection between the os uteri and vagina on the one hand, and the abdominal and other muscles on the other.

An internal examination reveals that the os uteri has, as it were, disappeared, the uterus and vagina now forming one canal, the lower part of which is occupied by the head of the child, which has completely engaged the vagina. Possibly the anterior lip of the uterus may still be felt, for occasionally this is very much pushed down, and may be felt stretched over the head of the child, not, however, in any degree attenuated, but thick and apparently œdematous; sometimes it descends so low as even to protrude externally; but there is no need to interfere with it.

As the pains come on and go off, so the head advances and recedes until it comes to rest upon and to distend the perineum. By this provision the parts are gradually acted upon and alternately relieved; and in this way lacerations of the perineum are averted, while the patient has time also to gain rest and strength in the intervals. The rectum is flattened by pressure, and its contents, sometimes also its mucous membrane, are extruded; the hæmorrhoidal veins are a good deal distended, and form a dark purple ring round the anal orifice.

As soon as the perineum and external labia have become sufficiently distended, and pain follows pain in rapid succession, the patient meanwhile straining to her utmost to effect the expulsion, the climax at length arrives—a sharp pain, a scream, considerable mental excitement, a violent and prolonged effort, and the head of the child is born; a few minutes' rest may perhaps follow, or the same pain may suffice to expel the child completely, and with it to conclude the second stage of the labor. In cases of cranial presentation, the child will generally be born with one shoulder passing under the pubic arch while the other sweeps along the floor of the perineum. As soon as the breech passes, the rest of the liquor amnii escapes in a gush, and the uterus, emptied of the greater part of its contents, contracts upon the placenta, which, however, still remains for awhile in utero.

The Third Stage of Labor.—After the birth of the child and the consequent termination of the second stage of labor, a lull generally takes place; the uterus seems at first tired of its recent effort, and many minutes may elapse without any attempt at contraction. Ultimately, however, a slight pain is experienced, not at all of a bearing-down character, and unaccompanied by any effort on the part of the patient, but sufficient to detach and dislodge the placenta and its membranes, which are gradually expelled with a slight gush of blood (dolores cruenti). Formerly it was thought that the fœtal or amniotic surface of the placenta was the first to protrude, it having been forced into that position by the gradual contraction of the uterus drawing the edges of the placenta to its centre, and thus giving the appearance indicated in Fig. 67. Later views, however, are opposed to this, and the subjoined illustration (Fig. 68) represents the more modern, and probably the truer, view of the question, as has been pointed out by Dr. Matthews Duncan. Here it will be seen that the placenta is being extruded edgeways, as it were, and it is the edge of the placenta which ordinarily is first felt in cases where this stage of labor is left entirely to nature. A very slight tractile force applied to the cord is sufficient, when the placenta is detached, to draw down its central portion, or to give rise to the kind of inversion which is represented in Fig. 67. The other is, however, I believe, the truer view of the phenomena as they occur in practice.

FIG. 67.

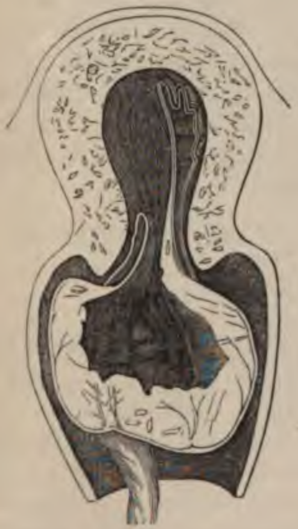
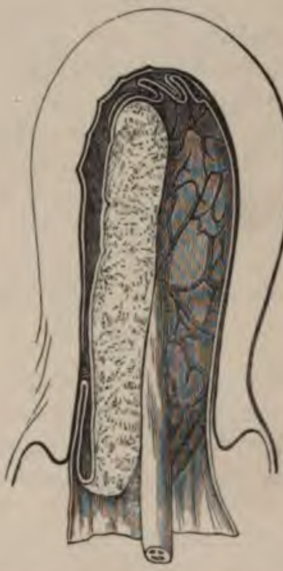


FIG. 68.



In this way, then, the labor is completed; and the uterus may now be felt as a hard globular mass, about the size of a fœtal head, just above the symphysis pubis, in the centre of the hypogastrium.

In regard to the force employed by the involuntary and voluntary muscles during the progress of labor, Professor Haughton has made some highly interesting and important observations, and has established conclusions which are sufficiently startling. His experiments and calculations show that the expulsive effort of the uterus alone, while employed in dilating the os uteri during the first stage of labor, amounts to about 3.4 pounds on the square inch. This fact he compares with the calculations made by Dr. Matthews Duncan to the effect that a force of not less than 3 pounds to the square inch is required to rupture the membranes. So that the involuntary muscular force is alone more than sufficient for that purpose. But, over and above this, the voluntary force which is capable of being exerted by the woman is at least twelve times as great. Dr. Haughton assesses it at 38.6 pounds to the square inch, and it is evident that here is the great moving power of labor; what that is in its totality may be roughly estimated as follows:

Involuntary or uterine force, .	3.4 lbs.	to the	square	inch.
Voluntary or abdominal force,	38.6	"	"	"
Total, . . .	42.0	"	"	"

And, assuming that the fœtal head has a diameter of 4½ inches, the total force represented as capable of being applied over its surface would be 593 lbs., or nearly a quarter of a ton. Of course, it is not to be supposed that such a force is really wielded, but only that it is possible. According to this calculation, much, no doubt, depends upon the continuous exercise of volition, and hence the employment of chloroform, which necessarily interferes somewhat with voluntary action, must to a certain extent also check the process of labor according to the degree in which the will is withdrawn.

CHAPTER III.

MANAGEMENT OF NATURAL LABOR.

The duties of the practitioner in the management of natural labor are really very simple; and, as a general rule, the more he trusts to nature and the less he interferes himself, the better will it be. The only instrument he needs is a gum-elastic male catheter, and the only drugs which it is desirable he should have at hand are a little laudanum, some antimonial wine, and some preparation of ergot; the freshly powdered grain is no doubt the best and most efficacious preparation, and next to that the liquid extract of the British Pharmacopœia. Probably no drugs may be required, but at night-time, or in the country, far removed perhaps from a druggist, it is well, in case of any difficulty, to be prepared for any emergency, as otherwise, if mischief occurs, blame is sure to be cast upon the attendant for not having been properly provided with all possibly necessary appliances; for the same reason a pair of forceps may be carried, as they might be required to terminate labor speedily.

Of late years some admirably fitted obstetric bags have been devised which form a complete armamentarium for the obstetric practitioner; one of these is represented in the chapter on the Obstetric Operations.

During the last few weeks of pregnancy the patient should, if possible, take a fair amount of exercise, and especial care should be taken that the bowels are kept regularly open. The diet should be carefully studied, in order that no irregularity may occasion gastric disturbance—the great forerunner of spurious pain; everything, in short, that can tend to maintain good health, should be enjoined.

On being summoned to a patient the point first to be determined is the fact that labor has actually begun, and as pain is usually that which first assures the patient of its commencement, it is necessary to distinguish between true and false pains.

True pains are distinguished by the following phenomena:

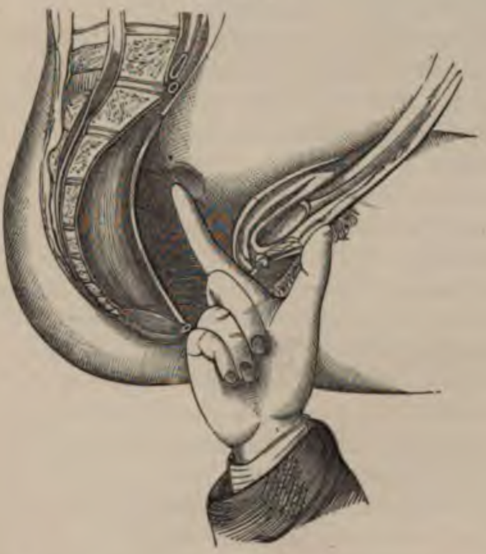
They begin at the fundus and proceed downwards to the cervix; the presenting part at first recedes, but subsequently is depressed; the pains and the intervals between them are regular; they also steadily increase in severity; they are felt mostly in the back and loins, and they have the peculiar grinding or cutting character already described.

Spurious pains, on the other hand, are irregular in incidence; they are also shorter, sharper, and more spasmodic: they are felt mostly in front, have little or no effect upon the uterus, and they do not in any marked degree affect the presenting part.

The treatment of spurious pains must vary with the cause; as a rule, opiates should not be given until the bowels have acted well. I am in the habit of administering first of all some aperient, such as castor oil or rhubarb and magnesia, and following this up with a good dose of chlorodyne, thirty or forty drops, or with sulphuric ether, henbane, and camphor-water; but in all cases we must try to discover what is the cause of the pains; having done which, the treatment will generally be easy enough.

Vaginal Examination.—If we are satisfied that the pains are genuine, and that labor has really begun, no time should be lost in making a vaginal examination, in order not only to satisfy ourselves, but also the patient, that the presentation is natural, and that all is going on well. It is of great importance that this examination should be made early, that the nature of the presentation may be determined, and that in the event of there being any malposition of the child, we may be at hand at the proper time to turn, if need be, before the rupture of the membranes. In making a vaginal examination the patient should be placed on a couch or bed, upon her left side, with the legs drawn up towards the abdomen; the forefinger of the right or left hand, according to the convenience of the examiner, previously greased, should then be introduced into the vagina, and passed in a direction backwards and upwards towards the promontory of the sacrum until the globular mass of the lower portion of the uterus is reached, the orifice of which should be detected, and the finger gently introduced just within, so as to discover the nature of the presenting part of the child. These several points are very well represented in progress in the subjoined illustration, Fig. 69. If it be the head we shall detect it by its hardness, and by the presence of the sutures and fontanelles: its position will be further made out in the manner already detailed. During this time we should remember to notice the temperature and moisture of the vagina, the state of the soft parts as regards dilatability, and whether the membranes are entire or not. This knowledge, after a little experience in such matters, and after watching the frequency and character of the pains, will enable us to form some idea, not only of the character of the labor, but also of its probable progress and termination.

FIG. 69.



It is well, however, not too hastily to commit oneself to any opinion as to the probable duration of the labor, for if it prove to be correct no credit will be gained; while if incorrect, blame will certainly be attributed. The examination should be made not only during but in the interval of a pain, without which it is impossible to gain any very definite information; and it is also desirable, if we wish to win the confidence of the patient, that this examination be conducted with ease and facility. This, however, can only be learnt by practice. The readiest way of making a vaginal examination is to place the forefinger at once against the lower part of the symphysis pubis, lengthways in the direction of, or parallel to, the labia, feeling which, a slight movement of the finger will readily separate them, and this may be facilitated by a movement of the thumb upon the side of the labium, lifting it up as it were so as to favor the entrance of the forefinger within the vagina. It is of great importance that this examination should be conducted carefully: any bungling about it is not only personally offensive to the patient, but is sure to destroy confidence, from a belief that the attendant is a novice at his work and cannot have had much experience.

After the examination is completed, if the labor be not far advanced, it is better that the patient should get up, and either sit or walk about. When her pains come on she will generally find it best to stand up and lean on the back of a chair, the foot of a bed, or a table.

If the labor be only in the first stage, the os but little dilated, the pains slight and occurring only at long intervals, and the case is not proceeding rapidly, there is no need for the attendant to remain in the house, unless from previous experience of the case there is reason to anticipate a speedy delivery. The patient should be frankly told of the condition of things, as she is then far less likely to be disturbed by the absence of the attendant. Directions should also be given to the nurse to send if any rapid advance is being made; this can usually be judged of either by the severity, frequency, or altered character of the pains, or by the rupture of the membranes. When this occurs the practitioner ought at once to be made acquainted with the fact, in order that another examination may be made. Some refreshment may be given to the patient from time to time, according to her own fancy: if the bowels have not been lately relieved, an enema of warm water or gruel will be advisable, and should the labor be at all tedious, care should be taken that the bladder is freely emptied; if this cannot be done naturally, the catheter should be introduced.

It is as well at this time to see that a few strands of thread, four or five, or a piece of ordinary twine, or ligature, or tape, are in readiness for tying the cord; also a pair of scissors, and a binder; for the latter, a yard and a half of ordinary unbleached calico, folded to about nine or ten inches wide, answers admirably.

We can generally tell, by observing how the patient bears her pains, whether the labor is progressing; consequently, during the first stage there is no need for frequent examination; indeed, if we are once sure that all is natural, we may wait for a second examination till either the membranes rupture or until we observe that the patient is driven to make efforts of expulsion. This latter symptom generally indicates that the os is fully dilated, that the head is passing through, and that it is making progress downwards into the vagina—in other words, that the first stage of labor is completed, and that the second, namely, the expulsion of the child, is about to begin. Too much examining only distresses the patient, and is apt, moreover, to inspire a want of confidence from an impression that the attendant is not quite sure of the nature of the case.

Up to the present time the patient may have been sitting up, but with the full dilatation of the os and the passage of the head into the vagina, it is desirable that she should be at once placed on the bed in the position for delivery, that is, not too close to the edge of the bed, so as to leave room for the child when born. The nurse will, of course, have guarded the bed by a piece of waterproof or mackintosh and a draw sheet, and have so arranged the dress of the patient and the bedclothes, that with as little disturbance as possible she may, soon after the completion of the labor, be comfortably put to bed without fear of injury from either damp or uncleanliness.

The medical attendant must be guided entirely by circumstances in deciding as to the necessity for his remaining in the room from the commencement of the second stage. As a rule, unless the patient has generally quick labors, and there be strong uterine action, with rapid progress, he need not do so at first, provided, of course, that he be not far distant. It should be remembered, however, that as a general rule, after the full dilatation of the os, the labor is much more than half completed in point of time, and an examination during one or two pains will fairly indicate the probability or otherwise of speedy delivery.

Care should always be taken in the examinations which are made in the early part of labor, especially during a pain, not to rupture the membranes; as labors are generally more tedious when this accident happens before the complete dilatation of the os. On the other hand, when the first stage of labor is completed, and the head is beginning to pass into the vagina, we ought, if the membranes be still entire, to puncture them, as they are no longer a help, and may be a hindrance. A little firm pressure with the tip of the finger, or a sawing movement with the finger-nail, on the projecting membranes during a pain, will generally suffice to rupture them. If, as sometimes happens, they are more than ordinarily tough, a knitting-pin or a hairpin made straight, or any similar instrument, should be passed, carefully guarded by two fingers, up to the membranes, and with the slightest pressure against the tense membrane during a pain, a puncture can easily be made.

The escape of the liquor amnii with the os uteri fully dilated, and the head ready to descend, will usually give an impetus to the labor after the lapse of a few minutes, during which the uterus adapts itself to its smaller dimensions. Sometimes a single pain suffices at this stage to drive the head down on to the perineum. The attendant ought on no account to leave the patient's bedside with the labor so far advanced; he should sit by prepared to support the perineum, should that part seem to be dangerously distended.

With regard to this question of *supporting the perineum*, much difference of opinion exists. Dr. Graily Hewitt contends that not only is the practice quite unnecessary, but that very often it is absolutely mischievous. Dr. Churchill also, while advocating support, adds that "it has been my lot to witness more than one case where rupture was owing to excessive and injudicious support." Most obstetric writers, however, insist upon the necessity for some support being given to the perineum if we would avoid laceration. My own opinion is, that when the head has had fair time gradually to stretch the perineum and surrounding structures, there is no need whatever for this, to say the least, most unpleasant proceeding; but when the labor is, either naturally or artificially, rapidly terminated, when, in other words, the perineal structures are suddenly and severely strained, then I believe there is danger of laceration, and consequent need for manual support.

In forceps cases, as a rule, I think this proceeding is advisable, but in the common run of cases I never interfere in any way with either the mother or child during the passage of the head through the external parts. Where it is really necessary, a napkin should be placed over the part, and gentle pressure *by way of support* made from the coccyx to about two or three inches in front of the anus, in fact, over a space measured by the palm of the hand. The direction of the pressure should be forwards and upwards, guiding the head, as it were, under the symphysis pubis.

As soon as the head is expelled, we should at once see whether the cord is round the neck, as this very commonly happens; and if it be, it should either be pulled down so as to slip over the head and shoulders, or else loosened so that the child may pass through it. There need be but little fear of the dangers which have been rather ingeniously imagined of a short cord giving rise either to inversion of the uterus, hæmorrhage, strangulation of the child, rupture of the cord, or to arrest of the descent of the child. In very exceptional cases, however, the cord has been found so short that its division was necessary before the birth of the child.

Care should always be taken to wipe the mouth of the child with a napkin as soon as the head protrudes, as a little mucus commonly hangs about the lips, and might prevent respiration.

At first no attempt should be made to extract the child, should the uterus not expel it, as the delay is always occasioned by a temporary arrest of uterine action following the partial emptying of that cavity, and consequently the extraction of the child under such circumstances might be the cause of post-partum hæmorrhage. There is almost always a short interval at least, after the birth of the head, before complete expulsion.

If the shoulders and body of the child do not follow after awhile the birth of the head, and if the child seems in danger of strangulation or apoplexy, evidenced by its face becoming livid, congested, and swollen, we ought, even at the risk of hæmorrhage from want of uterine action, at once to attempt extraction, as otherwise the child is sure to be sacrificed; it will also generally be found that the removal of the child will of itself excite uterine action, and thus all danger will be avoided. Gentle traction may be made upon the head, but it is better, if possible, that the finger of the right hand should be passed up along the neck, and hooked round the axilla so that traction may be made thereon; this generally suffices to effect delivery; at the same time firm pressure should be made upon the fundus uteri, following the descent of the child; in this way not only is hæmorrhage prevented, but the uterus will the more readily expel the placenta with or soon after the birth of the child. This applies to all cases, and is a practical point quite worthy of adoption.

As soon as the child is born, it is thought that the contact of air with the surface of the body excites respiration by reflex action, and this is made evident not only to the eye but to the ear by a hearty scream; then the child may be separated from the mother. If respiration be not established, separation may be delayed, at least for a time, though it seems doubtful whether the continued connection with the mother is of any further avail. The treatment of this condition will, however, be considered subsequently. Before dividing the cord a ligature should be applied about two and a half inches from the child's abdomen; great care should be taken to tie this ligature securely, for, in truth, the child's life depends upon this. Another ligature should also be applied about two inches nearer the placenta and the cord; it may then be cut about half or three-quarters of an inch from the first ligature. Some authorities consider that there is no need to apply a second ligature in order to prevent the flow of what little blood remains in the cord and placenta, for "the evacuation from the open extremity of the cord will yield two or three ounces of blood, which favors contraction of the uterus and expulsion of the placenta" (*Dewees*). It is better, however, I believe, to resort to the ligature, and certainly when there are twins we ought to do so, in case there should happen to be vascular communication between the two placentæ, which, by the way, is seldom or never the case: moreover, the ligature is of use, as the late Dr. Rigby remarked, "to prevent its being said, in case the second child is still-born, that it had died from no ligature having been applied upon the placental extremity of the cord."

The child being now removed, our next care is for the *placenta;* gentle pressure should be made upon the uterus, and the organ grasped, as it were, by one hand: as a rule, this will suffice to excite uterine contraction and the consequent expulsion of the placenta into the vagina, so that on introducing the finger the insertion of the cord will be reached; when this is felt it may always be taken as an indication that extraction is admissible. For this purpose the cord should be gently drawn with the left hand, while the two forefingers of the right are in the vagina, and should be made to serve as a fulcrum or pulley round which the cord passes, and by which, at the same time, it is drawn down in the direction of the lower part of the curve of the sacrum, or the outlet of the uterus. Should this not suffice, the question will arise whether any further attempt should be made to remove it.

Provided all is quiet, that there is no bleeding, and that the uterus can be felt well contracted, too much anxiety to remove the placenta may be very dangerous, for until separation has taken place between it and the uterus, all attempts at removal are nearly certain to excite flooding. A few minutes generally elapse after the birth of the child before the placenta comes away, but in a short time slight pain will be experienced, with possibly a little gush of blood, and this may be regarded as an indication that separation has taken place. There is, however, one almost unfailing test by which we may judge when the placenta has become detached from the uterus, and consequently when it may be removed, even though still in the uterine cavity. This knowledge is all the more serviceable from the fact that when once we are sure that separation has really taken place, there is no longer any need to wait, and nothing to prohibit its removal by the hand: the test in question is the presence or absence of pulsation in the cord, for while it remains attached to the uterus pulsation will still be felt, the cord will also be full and elastic under pressure between the finger and thumb. When, however, separation has taken place, the elasticity and fulness disappear, the cord gets flabby, limp, and cold, and no pulsation can now be detected in it. At the time separation is effected there is generally a slight gush of blood with it. If a little uterine action can now be set up, expulsion is sure to follow; and for this purpose, gently kneading the uterus will generally suffice, but should it not, and half an hour has elapsed since the child was born, provided there is good evidence that the placenta is detached, my invariable custom is to remove it. We are generally able at this stage to feel the insertion of the cord into the placenta, and if traction does not bring it away, as it very often will not, owing to a slight constriction by the cervix, the forefinger should be introduced somewhat higher, so as to get above the edge of the placenta, round which it should be hooked, and it can then generally be removed. Should this fail, and the placenta still remains in the cavity of the uterus, there is nothing left but to introduce the hand, seize hold of the placental mass, and draw it down. The presence of the hand in the uterine cavity usually suffices to insure contraction, and this is of course the only safeguard we have against hæmorrhage.

The careful management of the placenta is a matter of considerable moment, indeed it is, above all others, that which requires from the practitioner the greatest care and attention, for until it is removed and the uterus firmly contracted, the patient cannot be said to be altogether free from danger, the danger, that is, of flooding. We need not be alarmed if the uterus can be felt firm and hard, even though the placenta be still in its cavity;

for we are at least safe against hæmorrhage so long as the uterus is contracted: but it should be remembered that hæmorrhage may, when the uterus is relaxed and flabby, be going on into its cavity, and may even take place to an alarming and fatal extent, without appearing externally, owing to the orifice being closed over by the placenta. It should also be borne in mind that when hæmorrhage has taken place to any extent, there is, even after the uterus has once contracted, danger of its returning by recurring relaxation of the uterus, consequent on the deprivation of the stimulating blood. We should never, therefore, rest content until the uterus is firmly contracted after the placenta and membranes are all expelled. Care should also be taken that no portion of either of these is allowed to remain in the uterus; it is a good plan, therefore, always to examine the placenta as soon as it is removed, so as to be quite sure that all has been expelled. If any of the cotyledons are found to be missing, or any portion of the membranes not expelled, the finger should be again introduced either into the vagina or the uterus, and the missing portion, if discovered, be removed. The danger of allowing any portion to remain is twofold; first, there is great liability to hæmorrhage of an aggravated character, not so much from its rapidity as its constant recurrence; and secondly, the fear that decomposition will be set up in the uterine cavity and absorption of putrid matter take place, ending in phlebitis and probably puerperal fever; at the same time, if much difficulty is experienced in the removal, it will be better to wait a few hours, in the hope that the uterus may expel what remains, rather than run the risk of injuring the uterine walls. For further remarks on this subject, see the chapters on puerperal fever and phlebitis.

As soon as the placenta is away, the hand should be placed over the uterus, and gentle pressure be made, in order to excite that organ to firm and persistent contraction; at this time the uterus will be felt deep in the hypogastric region, about the size of a child's head at term. Having secured firm contraction, a binder should be applied round the body, and a pad, formed of one or two folded napkins, should be placed over the uterus; in this way pretty firm support may be afforded, to the great relief and comfort of the patient, and in some degree as a preventive against future relaxation of the uterus and consequent hæmorrhage.

The patient should be allowed to remain in the same position for at least an hour, and be kept perfectly quiet, before any attempt is made to move her to the other side of the bed; the damp clothes should then be removed, and a warm dry napkin be applied to the vulva. The attendant should not leave the house for twenty or thirty minutes at least after the birth of the placenta, nor until he has assured himself that there is no fear of subsequent hæmorrhage. Dr. Rigby advised that the child should be put to the breast before the practitioner leaves the house, as this, he said, through the sympathy between the breast and uterus, is sure to excite uterine action. "Even if the child sucks fairly well for only five minutes we feel satisfied, for we cannot call to mind a single case of hæmorrhage after the effects of this operation."

Some authorities are in the habit of always administering an opiate directly after labor; there seems to be no good reason for such a practice, while there is clear evidence that opium rather retards than favors uterine contraction, and hence increases the liability to flooding.

The patient should be seen again within twelve or at most twenty-four hours after labor, when the chief points requiring attention are—1, the condition of the pulse; 2, the state of the bladder, whether water has passed or not; 3, the character of the discharge; and 4, the degree of uterine pain or abdominal tenderness. Inquiries should also be made as to whether any sleep has been obtained, whether there be headache, and as to the general condition of the patient.

The pulse ought not to be much in excess of that of health; it has been said, and with truth, that if within the first week or ten days the pulse reaches one hundred, there is room for suspicion that all is not well; if it reaches one hundred and twenty, there is cause for anxiety; and if above that number, there is great danger; in all cases, some form of puerperal fever is the dreaded enemy.

Occasionally, and this is especially the case after protracted labor, there is difficulty and pain in passing water. This arises, probably, from some slight bruising which the bladder has received, and it usually passes off in a few hours; but should the bladder be distended and the patient be unable to empty it, a warm fomentation, or the holding of a hot sponge over the vulva, will be found very soothing and generally effective; should it not suffice, then the catheter must be employed. The opposite state to this is sometimes found to exist; instead of retention there is incontinence, and this may arise either from previous long-continued pressure by the child's head, producing temporary paralysis of the sphincter vesicæ; or impaction of the head may have produced the more serious lesion of sloughing. The latter condition will be considered subsequently. For the former, all that is required is rest, and time will probably suffice to restore the power of the sphincter. Should it not, the tincture of steel, mineral acids, quinine, and tincture of cantharides will generally be found successful.

The discharge from the vagina which usually takes place after parturition, and to which the term of *the lochia* is given, consists for the first few hours of blood alone, and is supplied from the now denuded uterine walls. It gradually loses its purely sanguineous character, and becomes more and more "watery," of a dirty brown or greenish-brown color, and in the course of two or three weeks it ordinarily stops altogether. Special attention should always be paid to this discharge; its healthy character is a subject of considerable importance, while its suppression or its otherwise unhealthy character is often the earliest indication of approaching puerperal fever. One exception may be taken to this, in the case of stillborn children, where the discharge sometimes ceases entirely a day or two after labor, and that without any evil consequences.

If the discharge be excessive, astringents, and especially those of the chalybeate class, may be given. If, on the other hand, it be deficient, and especially if at the same time it be offensive, the vagina should be well syringed out once or twice a day with warm water, to which may be added a little of the liq. sodæ chlorinata, or of the liq. potassæ permanganatis, or of carbolic acid in the proportion of one to forty.

The third point to be inquired into at the first visit, and sometimes even in subsequent ones, is the amount of uterine pain. When any clots have formed in the uterus after delivery, or any shreds of membrane have been left there, the uterus is thrown into contractions to expel them, and so-called *after pains* are the result: these are not common in primiparæ, but to some extent they are almost universal in multiparæ. In a certain sense they are healthful, and should therefore be borne if possible; but if excessive, some sedative may be given; henbane and camphor, in pill, is probably the best form; lettuce and chlorodyne are also very useful; morphia is better than opium, and the liquid extract of the British Pharmacopœia is the best of the preparations of the latter. In giving opiates, however, it is well to bear in mind that they all more or less check uterine contraction, and on this ground, therefore, they are undesirable, for until the offending body is removed by uterine action, pain must be borne. In some cases clots continue to form for several days after labor, but the regular application of the child to the breast generally suffices to expel them. These pains are quite irrespective of, and are not usually accompanied by, any abdominal tenderness; there is, of course, always some slight tenderness after labor, but if it becomes severe, and especially if with it the pulse is quick and the discharge scanty, there are then grounds for suspecting inflammation in some part of the uterus. There may, of course, be tenderness on pressure, without much pain, and the attendant ought each day to satisfy himself on this point.

Sleep is nature's great restorer, and this is especially needed after parturition; at the same time, if possible, it should come naturally, not as the result of any drug; it not only refreshes the patient greatly, but is in itself an indication that things generally are going on well.

Dr. Rigby's views with regard to the early application of the child to the breast have already been given. He advised that, from the very first, the child should be allowed the breast at intervals of every three hours; and, according to White, "whether there be signs of milk or not." The stimulus of sucking favors the early flow of milk, the lacteal ducts are drawn out and straightened, and the nipple at the same time is being prepared for use. On the other hand, it has been stated (Ballard) that to put the child to the breast before the flow takes place, that is, before the breasts have become distended and painful, is not only mischievous to the child, by inducing diarrhœa, and a train of gastric disturbances, but is pretty sure also to injure and inflame the breasts, to crack the nipples, and to give rise to other disorders. The former of these two plans will be found generally successful; at the same time, if, as sometimes happens, this early sucking occasions pain to the mother, and distresses the child by its fruitless efforts, it is best to desist, and to give the latter for a time some simple milk and water, sweetened with a little sugar.

The first milk which flows, and to which the name of *colostrum* is given, differs in some respects from that which follows; it is thinner and more watery, and possesses slightly purgative properties; hence it is well fitted to expel the first intestinal excretions of the infant, which are usually of a dark, pitchy color, and are called the meconium. The milk which subsequently appears is thicker and richer in casein.

The first flow of milk usually comes in about twenty-four or forty eight hours, and is generally ushered in by some little feverish disturbance, usually denominated *milk fever;* occasionally this reaches to a great height, the skin becomes hot and dry, the tongue coated, the pulse quick and full; there is headache, thirst, and lassitude; the breasts are distended and painful; but in two or three days, if the child draws well, all this passes off without any mischief resulting.

The diet for the first few days should be light and unstimulating, but at the same time nutritious. The old-fashioned tea and water-gruel system has, it is to be hoped, long since ceased to be. As a general rule, I find it quite safe to trust to the patient's inclination; she will seldom choose things likely to be injurious, though her tastes are not limited to gruel or barley-water.

The bowels seldom act of themselves at first; a dose of castor oil, senna, or rhubarb should therefore be given, and relief should afterwards be obtained not less frequently than every other day. The recumbent posture in bed should be most strictly maintained for at least the first week, somewhat less rigorously for the second, when the bed may be exchanged for the couch. This is really necessary, because from the at present large size of the uterus, and the relaxed condition of its supports, displacement downwards and hæmorrhage are pretty sure to follow neglect of this rule. Moreover too early rising is sure in the end to lead to delay, for it arrests the natural process of involution, and the uterus is left large, flabby, and atonic; in fact, in the state known by the term subinvolution, a condition which will certainly give rise to much local and general distress in the future.

Abdominal support, in the shape of a binder, should be given during a fortnight at least, and not until after that period should the patient be allowed to walk.

It is scarcely necessary to state that inquiries should daily be made respecting the condition of the child, and a few remarks may here be made on that not very uncommon condition—especially after tedious labor and in cases of breech presentation—namely, *suspended animation.* Much discussion has taken place among medical jurists as to whether cardiac pulsation, though it be unaccompanied by respiration, is to be regarded as *proof of live-birth*. The subject is too extensive to be discussed here, but it may be well to state that several eminent obstetric authorities have given their opinion that pulsation or *any single vital action* is proof of live-birth; and, despite the authority of many of the most eminent jurists in this and other countries, this decision has been accepted by the law.

Under any circumstances, it is the duty of the practitioner in all cases of suspended animation, except where there is evidence that death has taken place some time previously, to attempt artificial respiration, and to use other means to restore animation. If the heart beats, the chances of success are good. It may be a question whether or not the cord should be divided in such cases; as a general rule, if pulsation has ceased in the cord, it is useless any longer to maintain the connection, and the ligature, therefore, should be applied.

The means at our command for exciting respiration are the Marshall Hall and the Sylvester methods: the latter is performed by placing the child in a sitting posture, and alternately lifting it up by its two arms and setting it down again, drawing down the arms and pressing them against the sides of the body; this movement is repeated about thirty times a minute. By this means it is thought that the movements of respiration are more perfectly and naturally performed than in any other way. I have tried this method many times, and with very considerable success, and certainly prefer it to the Marshall Hall method, which is conducted as follows. The child is laid on its abdomen, the arms are placed under the chin, the face is held up so that air may enter freely by the mouth and nostrils. The child is then rolled alternately on to its side and stomach about thirty times a minute, gentle pressure being made to facilitate expiration when the child is laid on its abdomen, while inspiration takes place when in the lateral position. Sometimes slapping the child's buttocks, dashing cold water suddenly upon it, friction over the thorax, or alternately placing it in a bath or basin of hot and cold water, will excite it to make respiratory efforts. One or all of these may be tried, and they should be persevered in for a considerable time. I have myself seen cases recover when so long as half an hour had elapsed before any attempt at respiration was made.

There is very often noticed, especially after lingering labors, a swelling on that part of the child's head which presented and was most depending; to this the name *caput succedaneum* has been given. It is a mere dropsical swelling, consequent on long-continued pressure, and speedily subsides after birth.

Occasionally other swellings form on the cranium: they are soft, elastic, evidently contain fluid, and round their edge a hard margin may be felt soon after their first formation. To these the name *sanguineous tumor of the scalp* or *cephalhæmatoma* has been given. They are collections or effusions of blood under the pericranium, and the hard ridge which is felt at the edge is formed of bone. They are perfectly harmless if left alone, requiring no treatment whatever, and are pretty sure to pass away in the course of a few days or weeks, the effused blood being all reabsorbed.

Inquiry should be made daily respecting the remains of the cord which is left attached to the child's abdomen. This generally shrivels, dies away, and drops off in about five or six days after birth; but sometimes it remains attached much longer. In rare cases hæmorrhage takes place, either before or at the time when this separation is effected. Occasionally it resists all treatment, and only stops with the death of the little patient. Hæmorrhage of this kind is more frequent in male than in female children. Sometimes it is caused by the ligature having been improperly applied; sometimes there is a want of power to throw out the lymph necessary to occlude the vessels, or inflammation and suppuration may come on and open them up, or there may be what is called a hæmorrhagic diathesis in the family.

As regards *treatment*, if the hæmorrhage occurs while the cord still remains attached, another ligature should be applied nearer to the body of the child. Astringents of various kinds should also be applied to the bleeding surface; powdered alum, or the perchloride of iron, are good for this purpose. In other cases pressure should be tried; this is, of course, very difficult with the soft abdominal wall. Dr. Churchill suggested, and in one or two cases it has been successfully carried out, the "filling the navel with plaster of Paris in a fluid state, which, becoming instantly solid, and being held *in situ* by the inner folds of the umbilicus, would be likely to make firm pressure." Lastly, if all these means fail, there is nothing left but to cut down upon the umbilical vessels and tie them; this most frequently, but not always, succeeds.

The diseases and complications which attend the puerperal month will be considered in a subsequent part of this work.

PART IV.

OBSTETRIC OPERATIONS.

CHAPTER I.

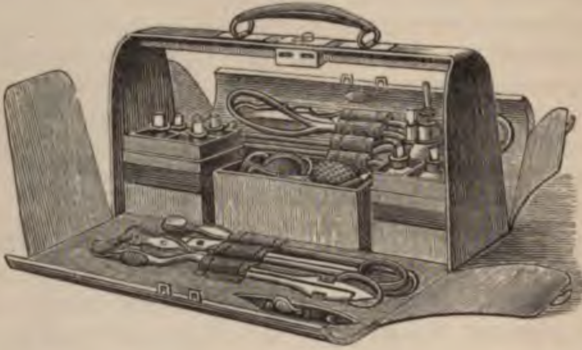
THE VECTIS.

BEFORE proceeding to a consideration of the second great division of labors, the Unnatural, it will be convenient to stop a little while on the way, and take a glance at the various Obstetric Operations which those labors often render necessary, and in treating of which there will be frequent occasion to mention these proceedings. This arrangement will, to the uninitiated at least, possess the advantage of enabling him the better to understand the rules hereafter to be laid down for guidance in the treatment of difficult parturition. With reference to the various instruments necessary for the performance of these several operations some remarks will be made in the chapters devoted to them, but it may here be remarked that a complete armamentarium can now be obtained in a very convenient and portable form, as is represented in the annexed illustrations (Figs. 70, 71), one of which shows the obstetric bag of Dr. Greenhalgh closed and the other open, and the various instruments are seen in it; of course, any particular kind of forceps or other instrument may be used in place of those illustrated, and for country practice especially, such a bag is extremely useful and convenient.

There are two leading divisions into which all obstetric operations may be divided: under the first head are arranged those which aim at preserving the lives of both mother and child: under the second head those wherein the life of the child is necessarily sacrificed in order to save that of the mother. The former includes the use of the Vectis, the Forceps, Version, the Cæsarean section, the Sigaultean operation, and the Induction of premature labor; the latter, Craniotomy, Cephalotripsy, Embryotomy, etc., where mutilation of the fœtus is accomplished.

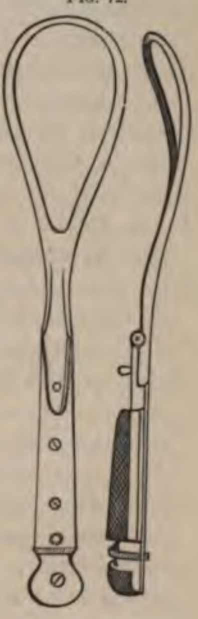
FIG. 70.

FIG. 71.



The Vectis is an instrument similar in construction to one of the blades of the long, straight, obstetric forceps, and is employed by different practitioners sometimes as a lever, sometimes as a tractor; its power in the former capacity is undoubtedly very great, but so also is its power for mischief. Its value as a tractor is very variously estimated by different authorities. The inventor, Roonhuysen, a Dutch practitioner of the seventeenth century, unquestionably designed it as a lever, for the original instrument consisted merely of "a flat piece of iron bent into a slight curve at both ends, and he generally employed it covered with soft leather." Since his time a great many modifications have been made in it, chiefly with reference to the degree of curvature of the blade, according as the author desired that it should excel as a lever or as a tractor; in the former case it was kept straight, in the latter curved. The most recent modification, and, as it appears to me, the best for the purpose in question, is that adopted by Dr. Uvedale West, which is represented in the annexed illustration (Fig. 72), and is thus described in the *Catalogue of Obstetric Instruments*, published by the Obstetrical Society of London: "The principal modification consists in a greater width of blade, or rather, of fenestrum, so that a considerable breadth of the fœtal head is grasped by it, as well as hooked, so to speak, by the beak." In addition to this, the blade is very strongly curved, and this, in conjunction with the great width of the fenestrum, gives an immense power or purchase, and makes it less likely to slip. The handle is, for convenience of carriage, jointed on to the shank.

FIG. 72.



This instrument measures twelve inches in length, five of which are taken up by the handle. The curve begins at about three inches from the handle, and resembles in outline that of the sacrum, being greatest towards the extremity, where is situated an oval fenestrum about two inches and a half long and one inch and a quarter wide; this is also the widest part of the blade, and measures about one inch and seven-eighths.

The Vectis is now chiefly used as a *tractor;* though formerly, as I have said, it was made to act as a lever of the first kind, but the danger from pressure on the soft parts is so great as quite to disqualify it for any such employment, unless extreme care is taken.

The cases in which it may be safely used are generally those where the short forceps might be employed, as where the head remains impacted either within the cavity or at the outlet, or where the expelling powers are feeble or faulty. When effective, it possesses the advantage over the forceps of being more readily applied, and is free from the troublesome difficulty often experienced of locking the blades of the latter. Some obstetricians consider also that it extracts more easily. At any rate, it can be readily applied in almost any direction where it works best. There are many cases, however, in which the vectis is utterly useless, and where we find the forceps perfectly successful; there is also less chance of injury from the latter than from the former when properly employed. On the whole, then, it may be said that though the employment of the vectis is very facile, its power is very feeble.

The circumstances in which the *vectis* may be safely and usefully employed are the following:

1. Cases of face presentation with impaction.
2. Cases where the brow presents, and where, by bringing down the vertex with the vectis, a face presentation is prevented.
3. Cases where the side of the head presents.
4. Cases of turning when the head cannot easily be extracted.
5. Cases where the head has engaged the pelvic cavity, and remains there from want of expelling power.
6. Cases of convulsions, or other serious complication requiring speedy delivery.

The vectis should never be used except where there is ample room; where there is a fully dilated or easily dilatable os; where there is some uterine action; and where one or other of the above indications for its employment exists. Whenever it is used as a lever, "the shank of the instrument should be grasped with the left hand, the outer edge of the little finger being applied towards the vulva, making that hand the fulcrum, and pressing the extremity of the blade on the child's head, by raising the handle firmly held in the right."

The introduction of the vectis is very much the same practically as that of the forceps, except that the instrument being single it may be applied just in that position where the force is required to be exerted, irrespective of the relation of the instrument to the pelvis. The patient and operator should occupy the usual positions, the former being on her left side, with the legs well drawn up and flexed upon the body, and with the nates near to the edge of the bed: the operator sits facing, as it were, the pelvic outlet. The instrument being well warmed and greased, two fingers of the left hand should be placed in the vagina to guide the application of the instrument to the head, over which, by the same kind of movement as is employed in the use of the forceps, the curve of the blade will be directed. I have stated that the instrument may be employed in almost any direction, and this is true; but practically, we find that in most cases it is required to be applied either to the occiput or to the face of the child—in other words, to one or other end of the head. Supposing that the head presents in the first position, and is wedged in the cavity of the pelvis, the occiput lying against the left foramen ovale, the instrument should be passed up in that direction, great care being taken in this as in all cases where an instrument is being passed within the cervix uteri, to avoid injury to that part, and especially to avoid pushing it on outside the cervix in the vaginal cul-de-sac. The object which we have in view in this case is to produce the movement of flexion, for by bringing down the occiput we flex the chin upon the sternum, and thus bring the head into the pelvis in the best position in regard to the pelvic diameters. It may be laid down as a golden rule, which ought never to be violated, viz., *never to pass an instrument beyond the cervix, without having two or more fingers as a guide and shield to protect it during the passage.* In the case above referred to, the two forefingers of the right hand should serve as a guide, while the instrument is passed with the left; as soon as it is in the position we wish, the fingers of the right hand will serve the double duty of a fulcrum and as an aid in the process of extraction. We ought never to make a fulcrum of the maternal structures.

Some authorities, who take very strong exception to the use of the vectis under any circumstances as a lever, recommend that the fingers of one hand should be introduced on the opposite side of the head to which the vectis is applied. "Counter-pressure is thus made, as with the forceps, and the vectis may be used solely as a tractor." But it is obvious that this would be only a poor and clumsy substitute for the forceps, and that it fails in the very object for which the vectis was invented. When the instrument is well applied, we should endeavor to combine extraction with leverage, making a fulcrum of the one hand while we make use of what extracting power we may with the other. In most cases of impaction, a very slight lever-like movement will suffice to start the head in motion, and to dislodge it from its fixed position; after which it will probably descend simply by the uterine action. In some cases it may be necessary to apply the instrument first to one side, then to the other; in the latter case, of course it will be applied to the face of the child, and greater care will be necessary, both in its introduction, and subsequently, to avoid injuring the child. When applied to the face, the chin will probably be engaged in the fenestrum, and thus a greater purchase may be obtained for extraction. It must always be borne in mind, however, as Dr. Barnes has very properly and forcibly pointed out, that this instrument acts principally as a lever, though it may also be made to aid in the process of extraction. "It does not directly draw down the head, but by pressing upon one side or point of the head-globe, it causes the globe to revolve upon its centre, its axis representing another lever. If the point opposite to that seized by the lever be movable, of course, when leverage is applied, the head will roll up on one side as it comes down on the other; but if the opposite point be more or less fixed, as the occiput generally is, against the foramen ovale, or left ramus of the pubis, then leverage on the face and chin will effect rotation on that fixed point as a centre, and the bulk of the head will have descended." Of course, attention to co-operate with the pains will be observed in the use of the vectis as in the case of the forceps; and, if necessary, as I have said, the instrument may be successively applied to different parts of the head and face, according to the position and character of the impaction; now its power as a lever, again as a tractor, being brought into play. Greater caution is, if possible, required in dealing with this instrument than with the forceps; as the danger both to the mother and child, in the hands of the careless and ignorant, is greater in the use of the former than of the latter.

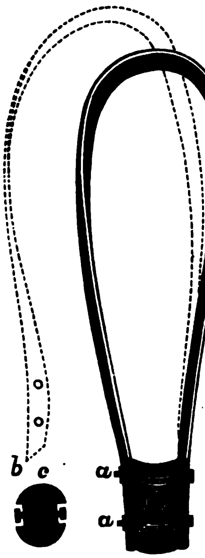
Very similar in its action and uses is

THE LOOP OR FILLET.

This instrument is generally made of whalebone, and possesses this among other advantages—that it can be readily extemporized.

The annexed drawing (Fig. 73) represents what I believe is by far the best instrument of its kind: it was invented by Dr. Westmacott, who has for many years used it with much success, and who gives the following description of it.

FIG. 73.



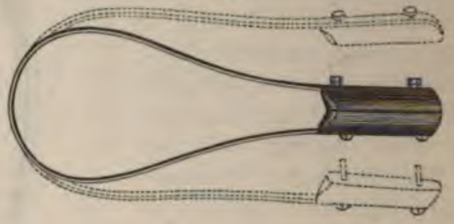
The loop ought to be from twenty-two to twenty-four inches long, allowing one and a half inches on each side of the handle; the width of the handle is one and a quarter inches, and is bevelled to allow the fore or second finger to hook over it; its length is from one and a half to two inches; it is round, as in the separate handle, which represents also the side-screws. The whalebone is from one-quarter to three-eighths of an inch in breadth, about one-eighth in its central thickness, and is perfectly smooth on both sides, with the edges reduced a little and slightly rounded, so that no abrasion may be caused by its use. On one side of the handle there are two screws with nuts (*a*, *a*, Fig. 73), seen also in section *c*, which easily allows one end of the loop to be removed, so as to slip readily over the head of the child as it passes through the external parts, in cases where the head is large, and there is danger of lacerating the perineum. The dotted lines in the annexed drawing (*b*, Fig. 73), show the end of the whalebone as it springs out when freed from the screws at *a*.

Almost identical in its construction and use is the fillet of Dr. Eardley Wilmot, which is represented in the subjoined figure; indeed, so similar is it to the instrument of Dr. Westmacott, that the same idea must have occurred to both authors; either is no doubt equally effective for the purpose in question.

The cases in which this instrument is applicable are those in which we should ordinarily resort to the vectis, and, according to Dr. Westmacott, it is equally applicable to many cases in which the forceps are used: where there is protracted labor, with deficient uterine action; also in certain cases of slight disproportion, where some traction force is required; cases of impaction in the pelvic cavity, etc.

The instrument is to be used thus: The loop is to be compressed at the distal extremity, so as to admit of easy introduction within the vagina, it is then to be passed up to the head of the child, being carefully guarded and guided by the fingers of the left hand, introduced within the vagina; as it passes above and behind the head it may be gradually expanded so as to embrace the latter; having done so, traction should be made and continued until the head is brought down to the point desired. Of course the direction in which the loop is passed, as also that in which traction should be made, will be governed entirely by the position of the head in the pelvis, and it will be understood that the position of the loop on the head of the child will be guided by its position in the pelvis. Sometimes it will, as it were, catch upon the chin, sometimes on the forehead, and sometimes on the occiput. The two latter are the most desirable situations, and great care is necessary when it is passed on the chin not to strangle the child by pulling it towards the throat.

FIG. 74.



Another form of fillet has been recommended by Dr. Sheraton: it is made of steel, and so constructed as to combine a rotatory action with the fillet principle. It consists of two blades of highly tempered and flexible steel, curved in a somewhat sigmoid form, fitted and fixed into the rotatory bars of the handle at one extremity, whilst at the other they are united by being riveted into a linked joint, which allows each blade to rotate in opposite directions, to the extent of 90°. The rotatory bars are also formed and fitted with stops to limit their motion to 90°. The bars rotate upon the handle, to which they are fixed by nuts, and the rotatory action is obtained by pressing upon the transverse bars, by which the blades are formed into a loop of elliptical form, having a short or transverse diameter of $4\frac{1}{4}$ inches, and a long diameter of $5\frac{1}{2}$ or 6 inches.

In introducing it, the bars are brought nearly, if not quite close together, and when *in situ* they are to be separated by pressure on the cross-bars of the handle, until the loop is sufficiently open to catch or loop the head in the situation desired.

The advantages which the author claims for this instrument over the forceps are, 1. That its application is easier from (*a*) the narrowness of its blades, (*b*) the thinness of its blades, (*c*) its flexibility; 2. That one blade is easier of application than two; 3. That it is less liable to injure either the maternal passages or the fœtal head; 4. That it occupies less space than the forceps; 5. That it can be used without the knowledge of the mother; 6. That from the facility with which it can be applied, the duration of the operation is shortened.

CHAPTER II.

THE FORCEPS.

THIS instrument has excited considerable discussion as regards the period of its first invention. It is generally believed that Dr. Paul Chamberlain was the author, and according to Dr. Churchill, it was used by him prior to 1647, though it was not generally known till many years after. From that time to the present the instrument has undergone many modifications, though the general principles have continued the same in all.

The frequency of forceps cases has been estimated by Dr. Churchill, from a very extensive collection of cases, to be, among British practitioners, about 1 in 171; French, 1 in 140; and German, 1 in 106; or, in a total of 985,446 cases of labor, about 1 in 115.

The result to the mothers, as far as can be gathered from the same sources, is, with British practitioners, 1 death in 29; with French and German, 1 in 34.

As regards the children, the practice in this country gives a fatality of about 1 in 4¾; on the Continent, 1 in 5¾.

It thus seems that the more frequently this instrument is employed the less is the fatality both to mother and child; and it must be remembered that high as this mortality undoubtedly is, it is still very far short of that following the operation which it is intended to avert, namely, craniotomy: here the maternal mortality is estimated at about 1 in 5, and every one of the children are necessarily destroyed. Where there is certain evidence that the child is already dead, craniotomy should be preferred, and the forceps, if needed, may afterwards be used. The advantage of perforating the head under these circumstances is, that delivery will subsequently be more easily accomplished.

There are commonly two kinds of forceps in use, the *Long* and the *Short*. The difference in length, though chiefly for accommodation to the high or low position of the head in the pelvis, really involves a great increase of power both as a lever and tractor; and it will be seen, by comparing the two instruments represented in the subjoined illustrations (Figs. 75, 76), that the chief difference between the long and the short forceps is in the addition of the shank between the handles and the blades. In Fig. 75, which represents Denman's short forceps, there is no shank; while in Fig. 76, which shows Waller's long forceps, the increased length is due entirely to the shank. Some authorities have added a *second* or *pelvic curve* to the blades of the long forceps, corresponding with the curve of the sacrum; others prefer that they should be straight. I have always found that one, and that the long pair of forceps, answers every purpose; its length is not inconvenient, however low the head may be, and, for reasons which will shortly appear, I prefer the instrument with the pelvic curve to that without it. The subjoined illustration (Fig. 77) represents the instrument which I have used for many years, and which, as I think, combines all that is required to make a perfect forceps. The separate blade shows the degree of pelvic curve; it will be noticed also that the handles are smooth and notched at the top in such a way as to facilitate traction. The following are the general dimensions of the instrument I am in the habit of using: total length, about 13½ inches; length of blade to lock, 8½ inches; length of blade to commencement of curve, 6½ inches; greatest width apart when locked, 2⅞ inches; space between the ends of the blades, ⅞ of an inch; fenestrum, or opening in each

FIG. 75.

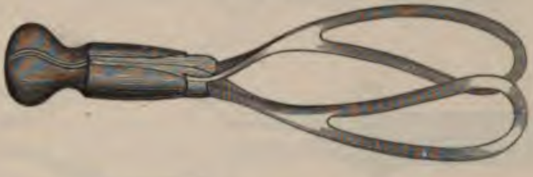
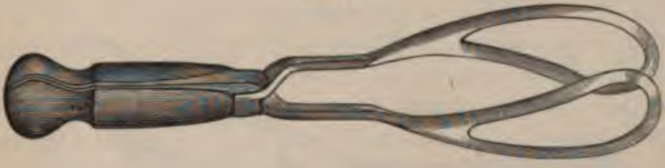


FIG. 76.



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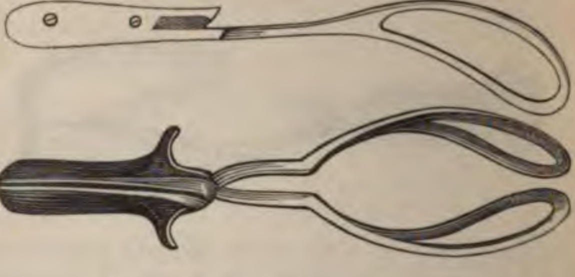
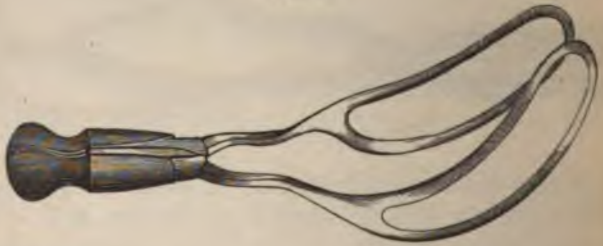
blade, 4¼ inches long, $1\frac{3}{16}$ inches wide; extreme width of ea
blade, 1¾ inches; pelvic curve, 1¼ inches. It is important that
the edges of the blades should be carefully rounded off, to av
the risk of any injury to the soft parts.

FIG. 77.



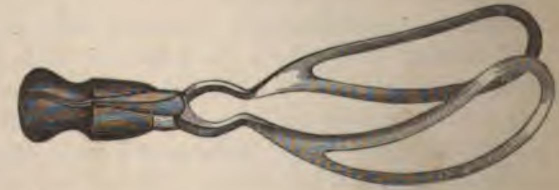
The annexed illustration (Fig. 78) represents probably the m
strongly curved forceps in use: it is the forceps of the late I

FIG. 78.



Davis, who was an advocate for the use of the double cur
There are few, probably, who use so strong a curve. The near

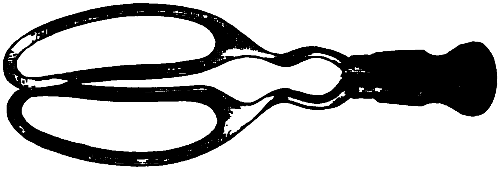
FIG. 79.



approach to it, I think, is the forceps of Dr. Greenhalgh, wh
is here represented (Fig. 79). He, however, uses also the straig

forceps, for the subjoined illustration represents his short straight forceps (Fig. 80). In both of these it will be seen that he adopts

FIG. 80.



the circular or ring form of shank, into which the forefinger passes, and by which extra tractile force is obtained. All these forceps are made by Messrs. Arnold & Sons.

Another very admirable form of instrument is that represented in the subjoined sketch (Fig. 81); it is the forceps of Professor Lazarewitch, of Charkoff, Russia, and one chief peculiarity in it is that the blades lock without crossing. They are simply apposed one to the other, and are kept in position by the little button which is represented on the handle. The author claims for this instrument the following advantages: 1. That as the blades do not cross, either one may be introduced first. 2. Each blade can be applied with equal facility, the first one introduced not being in the way of the second. The author regards this as a special advantage in cases where the head is high in the pelvis, and the vagina imperfectly dilated. 3. As the lock is in the handle there is no fear of pinching the soft parts. And lastly, when great compressing force is necessary, all hazardous pressure on the head may be avoided by the form of the lock.

Quite recently Dr. Aveling has advocated the employment of forceps having a double or rather a triple curve—that is to say, in which the handles are curved in the manner represented in the subjoined sketch (Fig. 82), for the use of which I am indebted to the courtesy of the editor of the *British Medical Journal*, Mr. Ernest Hart. Dr. Aveling claims for this forceps greater ease of application and increased power of traction. "Ease of application," he says, "is attained by removing the handles well out of the way of the operator when passing the blades and locking the instrument; and most efficient tractive power is insured by the handles being placed at an angle instead of parallel to the line of traction. Another advantage from this backward curving of the handles is, that they become less in the way of the patient's legs when the child's head sweeps forward over the perineum." As yet I have not had an opportunity of trying this instrument,

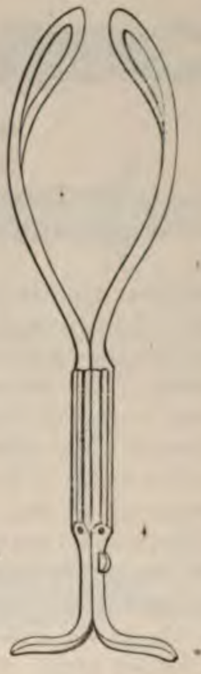


Fig. 81.

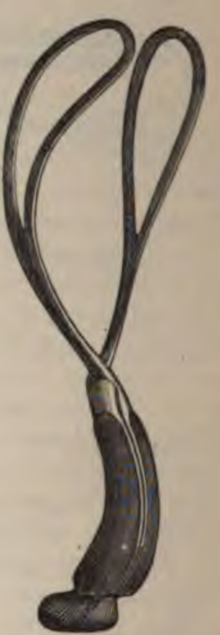


Fig. 82.

but I can quite imagine that its tractive power would be superior to the ordinary straight-handled forceps.

The *action* of the forceps is threefold: first, as a tractor; second, as a double lever of the first kind; and third, as a compressor. It will be observed that in these three capacities the forceps are intended to meet difficulties in regard to one or other of the three conditions incidental to all labors—conditions in which there is some deviation from the normal relation that should exist between the power or force, the body to be expelled, and the parts through which that body has to pass. Acting as a *tractor*, this instrument supplies a want in case of deficient uterine action, by a force acting *à fronte*, and its success will depend chiefly upon the amount of resistance to be overcome, but partly also upon the proper exercise of its tractile power; sometimes the resistance is little or nothing, the extracting force being all that is necessary; as where labor is retarded simply from want of uterine action. Where there is obstruction, the only thing to be considered is the probability of injury to the soft parts of the mother, and the applicability of the compressing power of the forceps to the requirements of the case. As a *double lever*, the forceps is often of great use where the head has become fixed in one position, and may be readily expelled when dislodged by a side movement of the instrument; indeed, this power is generally made use of whenever the forceps is applied. Lastly, the *compressing power* of the forceps will sometimes alone suffice to effect delivery, either where the head is slightly larger than usual, or where the pelvis is somewhat smaller; in short, whenever within certain limits the normal proportions between the head and the passages are disturbed. This compressing power is of course limited to the width between the blades of the instrument, which is thus fixed at a point beyond which the power could not safely be exerted.

Now, it will be obvious that, having regard to these three distinct and separate actions or powers of the forceps, the value of the instrument must depend entirely upon the way in which these several forces are exerted, and this again will be governed in no slight degree by the character of the instrument itself, in other words by the shape and dimensions of its several parts. Table I, page 228, shows how greatly these vary according to the fancy of individual authorities; it is taken for the most part from the *Catalogue of Obstetrical Instruments*, which I had the honor of editing several years ago for the Obstetrical Society of London, and the table in question was compiled from careful measurements made by Dr. Greenhalgh.

If now we compare Table I with Table II, page 229, we shall see that between the British and foreign authorities there are many and great differences.

A glance at these two tables shows that the foreign are much larger, heavier, and more powerful instruments than our own; and, on the other hand, while ours are amply strong enough, they are undoubtedly more easy of application, and probably for that reason, if for no other, less likely to do mischief. Speaking generally, it may be said that the power of the forceps increases with the length of its blades, and therefore with its leverage; while also the length and shape of the handles increase its power both

TABLE I —*Dimensions of Forceps by British Authors.*

Author.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.	Pelvic curve.	Form of lock.
Barnes, ...	15	9¾	6¾	4½	2	1	3	2¼	Ordinary shank ring.
Beatty, ...	12½	8	7½	5¼	1⅜	1⅛	3	Straight.	Ordinary.
Bird, ...	14	9	5¾	3¾	2	0¾	3	"	Ordinary shank ring.
Blundell, . . .	14	8¼	6¾	4¼	1¾	0⅞	2⅞	"	Ordinary.
Churchill, . . .	14½	8¼	6¾	4½	2	1	3	⅞	"
Collins, ...	10¼	5⅝	5⅛	3½	1¾	1	2⅞	Straight.	"
Conquest, . . .	13¼	7¾	7	5¼	2	0⅞	2⅞	"	Ordinary curved perineal shanks.
Davis, David, . .	12¼	6⅞	7	5½	1⅝	0¾	2½	Curved.	Ordinary shank.
Denman, . . .	11½	6½	6¼	4¼	1¾	0⅞	2⅞	Straight.	Ordinary.
Duncan, ...	13	8⅝	6½	4½	1¾	0⅞	2⅞	1¼	" " very easy."
Greenhalgh, . .	13	9½	7	5	2	1	2¾	3	Ordinary shank ring.
Hewitt, ...	13	8	8	5	1½	0½	2¾	Straight.	Ordinary.
Lever, ...	14	9¾	6¼	4½	1⅞	0¾	3	2¾	Ordinary shank ring.
Murphy, . . .	12½	8	6	4	1⅞	1	3	Straight.	Ordinary shank.
Oldham, . . .	13½	8½	6½	4	1⅞	0⅞	3	2	" "
Ramsbotham, . .	13	8⅝	6¼	4½	1⅞	1	3	1⅞	" "
Robertson, . . .	14	7	7	4	1⅞	1	3	Curved.	Ordinary.
Simpson, . . .	13½	8	6½	4¼	1¾	0⅞	3	2	Ordinary shank.
Smellie	11¼	6½	6½	4½	1½	0⅛	2¼	Straight.	Ordinary.

TABLE II.—*Dimensions of Forceps by Foreign Authors.*

Author.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.	Pelvic curve.	Form of lock.
Assalini, . . .	16	8½	6½	nil.	1½	¾	2⅜	5¾	Tenon and mortise.
Baudelocque, . .	18½	10½	7½	6	2⅛	¼	2¾	3½	Button screw.
Cazeaux, . . .	18	9¼	7	5⅝	2⅛	¼	2¾	2½	Pivot.
Cederschjöld, . .	15½	9½	7	4	1¾	½	3	2¾	Ordinary one side.
Charrière, . . .	18	...	6¾	...	2	¼	2⅝	Curved.	Button screw.
Chassagny,. . .	18	10	7	5	1½	nil.	2½	3⅜	" "
Hennig,. . . .	14½	8½	6¼	4¾	2	½	3	2¾	Ordinary.
Hugenberger,. .	13	8	5½	4½	1¾	1¼	3¼	2¼	"
Huevel, ...	20½	10	10	4⅝	1⅝	$\frac{3}{16}$	2⅝	2⅞	Slotted pivot.
Joërg, ...	13	7½	6	4½	1¾	¾	2¾	2⅜	Ordinary one side.
Krassovsky, . .	16	9½	8½	5½	1¾	½	3¼	3	" "
Lazarewitch, . .	13¼	...	7¾	4½	2	½	3	3¼	Tenon and mortise.
Levret, ...	15¾	8½	7¼	5½	2	⅝	2⅝	3½	Button screw.
Lovati, ...	18	9¼	6½	5½	2	⅛	2¾	3	Pivot shifting.
Martin, ...	14	9	9	5	1⅞	¼	2½	3¾	. . . .
Naegele, . . .	15	8½	8½	4½	1¾	⅛	2¾	3½	Pivot.
Pagot, ...	13¼	8½	6½	4¾	1⅞	1⅜	3	Curved.	Button screw.
Rizzoli, ...	17¾	9½	7	5½	1¾	⅜	2⅝	3⅜	" "
Siebold, ...	15	8½	7½	2¾	1¾	½	2¾	4	" "

as a tractor and compressor. In regard to the compressing power alone, our own are certainly inferior to the foreign. This power is dependent first upon the character of the lock, and is greatest where the blades cross one another; and secondly, upon the width or divergence of the blades; when the instrument is closed, the nearer these can be approximated the greater, of course, is the compressing power. At the same time, there are proper limits to the applicability of this force, beyond which injury to the child is certain; what those limits are, authorities are hardly yet agreed upon. Baudelocque thought that a quarter of an inch was all that could be secured safely, but as much as half an inch, and perhaps even three-quarters, can be gained without injury, provided only that the force be exerted gradually and for some time, and be as far as possible general—that is, not exerted at any one point of the instrument, but extended over the entire blade. Delore has laid down the law that the greater the traction the greater is the pressure, and that the latter is about equal to half the former. It becomes important, therefore, as Dr. Barnes has pointed out in his valuable work on *Obstetric Operations*, to economize traction as much as possible; and he gives the following as the principal rules for securing this. First, to take sufficient time to allow the head to mould. Secondly, to take care to pull in the axis of the brim, that is, perpendicular to the plane of the brim; always supposing, of course, that the head is so high in the pelvis. And lastly, to make slight lateral or rotatory movements; in other words, to use the lever power.

From a consideration of the *action* of the forceps, we may learn somewhat of *the conditions which generally indicate the necessity for their employment*, and these will be found to exist in all the cases mentioned below. It may be premised, however, that whenever we contemplate using the forceps, their triple action as tractor, compressor, and lever, should be considered; and the circumstances of the case must determine which of these powers will be most requisite in effecting delivery; sometimes it may be one, sometimes another, and we should be careful always to adapt the force to the requirements of the case. We should in fact bear in mind the essential condition present in every labor, viz., a due relation between the power or force necessary for the expulsion of the child, the body to be so expelled, and the parts through which that body has to pass.

Some practitioners are, as I have said, very fond of using, instead of the forceps, an instrument called the fillet, and I know of none better for this purpose than the whalebone form invented by Dr. Westmacott, and represented in the drawing, Fig. 74.

It is intended to be applied, and for this purpose it may be easily extemporized, in the form of a loop over the face (chin) or occiput of the child, so that by a lever-like process the head may be shifted from the position in which it is wedged, and gradually or, if need be, by successive applications, be brought down.

The forceps is applicable in the following cases: 1. Where uterine action having been strong has subsided, the parts being well dilated, or soft and dilatable, and the patient becoming exhausted: here there is nothing to prevent delivery but a want of expulsive power, and this is remedied by the traction of the forceps. 2. In face or cranial presentations; where the proper diameters of the head and pelvis are opposed, as where the long diameter of the head is in the short diameter of the pelvis. 3. When there is a slight disproportion between the head and the pelvis, which the compressing power of the forceps is able to rectify. 4. Where some other portion of the child presents with the head, as the hand, foot, or cord: here the forceps is needed to bring down the head, and so expedite delivery. 5. In cases where the trunk and extremities have been delivered, but the head remains at the pelvic brim or in the pelvis, the cord is being compressed, and the child will die unless delivery is speedily accomplished. Probably five minutes is the most that can be allowed for such a condition, if the child is to be born alive: of course, extraction without the forceps will be tried first. 6. In certain complex labors, requiring speedy delivery to save the life either of the mother or child, as in hæmorrhage, convulsions, syncope, rupture of the uterus, impending asphyxia, exhaustion, etc.

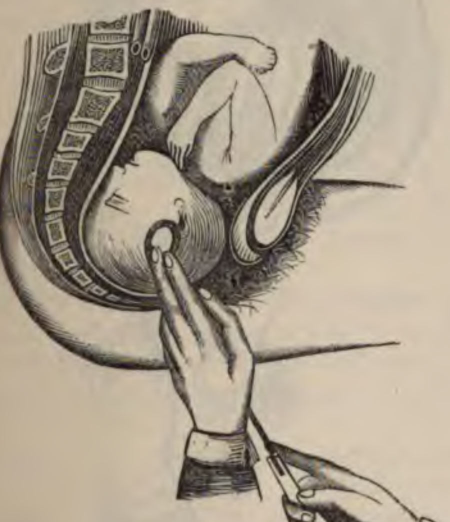
The *contraindications to the employment of the forceps* are—1. Where the os uteri is undilated and rigid, the perineum unyielding, and the soft parts much swollen and inflamed. 2. Where the head is too large, or the bones too firmly ossified to admit of compression within the required limits. 3. Where the pelvis is small, from distortion, or the presence of tumors, so as to reduce the conjugate or antero-posterior diameter to the extent of three and a half inches. As a rule, the forceps is inapplicable during the first stage of labor, except where from some obstruction at the brim the head cannot descend, the os being, nevertheless, soft and dilatable.

Mode of Applying the Forceps.—Whether we are using the long or short instrument, the position of the patient should be the same as in ordinary labor, viz., on the left side, but she should have the buttocks quite on the edge of the bed; if this precaution be not attended to, great difficulty will be experienced in the introduction of the first or upper blade, owing to the handle of the instrument coming in contact with the bed. The operator should sit directly facing the perineum. Care must be taken that the rectum and bladder are empty; to be sure of the latter, a catheter should be introduced. The membranes also should be ruptured, and the cervix be well dilated, or soft and dilatable. The next thing to determine is the exact position of the fœtal head and its relation to the surrounding parts: if *without any difficulty* an ear can be felt, this will of course decide the question, for, according to the position of the front part of the ear, so will be the direction of the face: in the absence of this, however, the position of the sutures and fontanelles should be accurately made out. The knowledge thus gained must be borne in mind throughout the application and employment of the instrument, as must also the anatomy of the maternal passages. Prior to the introduction of the blades, they should be well warmed, either by the fire, or, better still, by being placed in a basin of hot water. They should also be freely greased, and a little grease may with great advantage, especially if the parts are at all dry, be introduced into the vagina. No attempt should be made to introduce the blades during a pain.

As regards the question which blade we should introduce first, this depends partly upon whether we use the straight or curved forceps, for, if the former, there will be no difficulty about the lock, and, therefore, either blade may be used first; but if we use the curved forceps, that is, with the second or pelvic or sacral curve, then the upper blade is generally the best to introduce first, but in this we must be guided entirely by the construction of the lock, and as a little confusion sometimes arises on this score, the blades refusing to lock after their introduction, from their being wrongly placed, it is well first to lock the blades before introducing them, that we may see what will be their relation to one another when introduced.

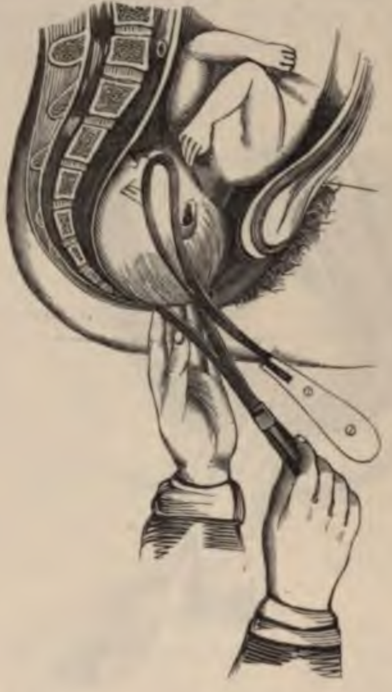
Supposing now that the child has presented in the first cranial on, that is, with the forehead towards the right sacro-iliac ondrosis, and the occiput towards the left obturator foramen, bly at the time when the forceps are called for the head will descended so far that its long diameter will have engaged ntero-posterior or conjugate diameter of the pelvis, the face in the hollow of the sacrum; two or more fingers of the and, well greased, are to be passed into the vagina along its side (as the patient is now placed), that is, on the right side e patient, as is represented, though of necessity very imper-, in Fig. 83. The fingers should rest upon the child's head,

FIG. 83.



should be placed just within the cervix uteri, so that they guide the point of the blade; the forcep is now to be held tly in the right hand, and almost in a directly vertical posi-so that the point of the instrument is placed at a right angle were to the palmar surface of the left hand, the fingers of h are in the vagina. The point is then to be introduced, and ually passed along the palmar surface of the fingers. The handle should be depressed almost, as I have said, to the perpendicular, but directed a little forwards as well, so as to cross the left thigh of the mother somewhat obliquely; it is then to be gradually elevated more and more to the horizontal, while at the same time it is passed slightly backwards, as the blade of the instrument passes up to and over the head of the child. When the point of the blade touches the child, it should be gently laid flat upon the side of the head, and throughout its course that is the position which should be maintained, always endeavoring, as far as possible, to keep the forceps over or near the ear of the child. The movement of the handle governs the point of the instrument, and this should be carefully guarded from injuring both the child and the soft parts of the mother. No force is required in this part of the operation: when once the blade lies flat on the side of the head, a slight rotatory movement with the handle from side to side, *not up and down*, and the gentlest pressure onwards,

FIG. 84.



always remembering the curve of the head, will generally suffice to effect its complete introduction; there is no need for the fingers of the left hand to be introduced further to guide the instrument; indeed, they would only be in the way, and cause much unnecessary suffering to the patient. The best and the only really proper guide is the knowledge of the operator of what he is about, and of the anatomy and relative positions of the parts concerned. In this he will be assisted by a glance at the position of the patient's spine, pelvis, hips, and thighs; he will further remember the exact position of the head, whether it be at the brim, in the cavity, or at the outlet: if at the former, he will probably use forceps curved to correspond with the sacrum, and this curve he must take into account; he will also, as the blade is introduced, remembering the direction of the axis of the brim, carry the handle more towards the perineum; and further, he must remember that the higher the head, the more is its long diameter placed obliquely, or even transversely to the pelvis; this requires that the forceps be introduced proportionately obliquely, but in the opposite direction to that occupied by the head. The lower the head the more will the forceps take the direction of the axis of the cavity and outlet.

When the first blade has been fully introduced, so that the side of the head completely engages, as it were, the hollow of the forceps, the handle must be passed close to the front, towards the symphysis pubis, and given to an assistant to hold during the passage of the second blade.

The proceedings with the second blade are *mutatis mutandis*, very much the same as with the first. The instrument should be warmed, greased, passed along the fingers of the left hand (Fig. 84), which have been previously introduced up to the head, within the cervix, opposite the handle of the other blade. Great care should be taken that the second blade traverses an exactly opposite course to the first, and in this position it must be guided throughout, so that when completely introduced the flat surfaces of the two handles shall exactly face each other and be accordingly readily locked; if there be any difficulty about the locking, they must not be twisted about, but one or both should be gently withdrawn a little distance and reintroduced, when they will probably fit more correctly. In doing this we must still take great care, as before, to avoid injuring the cervix as the blade is withdrawn and reintroduced.

Two points may here be specially insisted upon. First, we should be very careful not to injure the cervix uteri; and the best way to avoid it is to pass the fingers of the left hand within the cervix so as to keep it out of the way while the blade is passing along the palmar surface of the hand, till it reaches the head. Next, we should on no account use any force in introducing the blades, they ought to glide on without difficulty, and must never be pushed with it; force is dangerous, facility is safety.

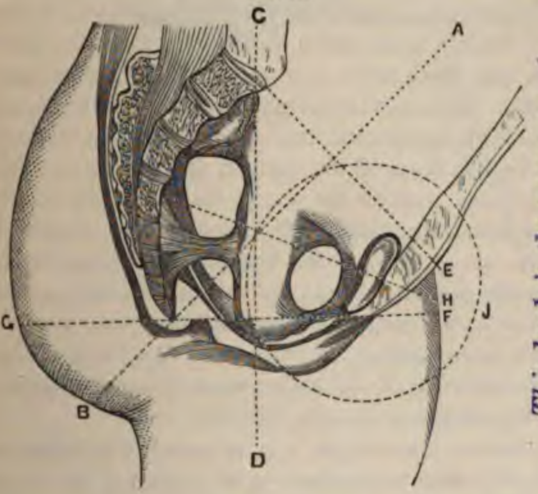
Both blades being introduced they are now to be carefully and gently locked, taking especial care not to nip any portion of the integuments in the lock. If the blades have been properly introduced no difficulty will be experienced in locking them. The handles may not perhaps at first be exactly apposed, but a little manipulation with one handle in each hand will probably suffice to bring them together.

The last stage of the operation, extraction, may then be attempted, and if there be uterine action this force should be applied *during the pains*, so as to aid the uterine efforts, the handles being brought firmly together. If there be no pains, no uterine action, then traction should be made at short intervals for about a minute or two, allowing a corresponding time to elapse between the attempts. The direction in which the force is to be applied must be determined by the position of the head, according to this rule, that we should always pull in the direction of the axis of the part occupied by the head: thus the direction will vary as the head descends; we must also make allowance for some difference in direction in the case of curved forceps. By the rule just laid down, it follows that, supposing the head to be at the brim, traction will at first be made directly backwards and downwards, the lock or handles of the instrument being close to the perineum: as the head descends traction will gradually be made more directly downwards, then downwards and forwards, and finally almost directly forwards. The handles will thus make a gradual sweep forwards from the perineum to near the symphysis pubis while the head is traversing the imaginary circle of Carus (see Fig. 85). Besides this traction a slight side-to-side or up-and-down movement may be made.

When the head has descended rapidly, and begins to distend the perineum, great caution is required, and probably if there be sufficient uterine action it may be well, rather than run the risk of too suddenly stretching the orifice, to remove the forceps, and allow the delivery to be accomplished by the natural efforts. This of course does not apply where the forceps are used for rigid perineum. When using curved forceps we should pull less with the handles than with the part of the forceps between the handles and blades. When the head reaches the perineum the handles should be directed, not only forwards at right angles with the pubis, but even a little upwards.

I have already stated that some special consideration must be given to cases where the head is high up towards the pelvic brim, and where consequently the long forceps are absolutely required. In my own practice I never use any but long forceps, even when the head is resting on the perineum. I do not find that they are any more difficult to apply. They are certainly not less effective, and I think it is important to get accustomed as far as possible to the use of one instrument: it is much more likely to be employed with facility. Those I use have the second sacral or pelvic curve very slightly: at the same time, it is enough for use even though the head be ever so high in the pelvis.

FIG. 85.



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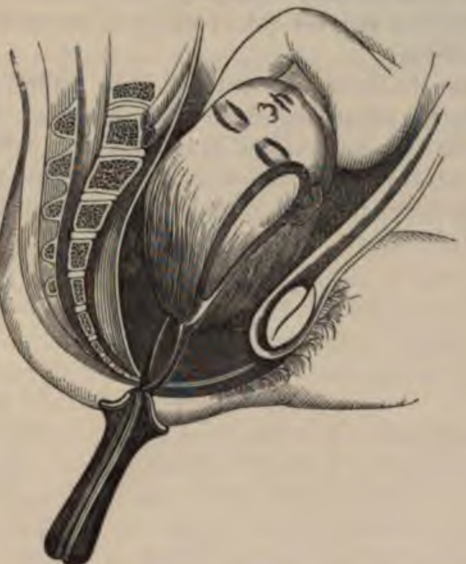
Now, the special considerations above alluded to apply more particularly to the position of the head as regards the pelvic diameters, and to the direction in which the blades are to be passed, bearing in mind the extent of their sacral or pelvic curve, for of course as this curve exists entirely for its adaptation to the curve of the sacrum, it follows that the blades are to be passed up in conformity with that requirement, and with less consideration to the relative position of the head, though this also must needs be considered so far as that is possible. Hence, in introducing the long, curved forceps, we should pass them as nearly as possible in the transverse diameter of the pelvis, that is, one over each plane of the ischium.

In applying the long forceps, therefore, with the head at the pelvic brim, we should place the patient as before described, and the nearer the nates are to the edge of the bed the easier will the operation be. The forceps should first be locked to show the relations of the lock, and the convexity of the pelvic curve should of course be to the left hand. I prefer passing the upper blade first, as its introduction is somewhat more difficult than that of the lower, and it is more readily applied when unincumbered by the latter. The cervix uteri is to be protected against injury during the passage of the blade within it by the two or three forefingers of the left hand, which should be just within the margin of the os, and which serve also as a guide to the passage of the instrument: this is to be held lightly by the right hand, and when the point of the instrument first enters the vagina the handle will be near the left thigh of the mother, nearly parallel with it; as the blade passes onwards the handle will be raised more horizontally, and at the same time will be brought more towards the axis, first of the cavity, then of the brim, of the pelvis; by the time it reaches the latter the shank will be close to the perineum, and the instrument will project horizontally from the vulva, the blade meanwhile encompassing the upper or right side of the child's head. The position of the blades when locked is represented, so far as it is possible to do so, in Fig. 86.

The second or lower blade is to be passed in a similar manner, and with the same precautions as to guarding the cervix from injury. The handle of the first blade is to be held somewhat anteriorly, so that the point of the second may be introduced behind it, in order that the two may lock readily. When first applied the handle will be held almost perpendicularly upwards, but a little diagonally across the upper or right thigh of the mother. The blade will pass over the left ilium, the handle descending as the blade enters the cavity and brim of the pelvis, until it also lies close to the perineum at the posterior fourchette, and projects horizontally from the vulva in the direction of the axis of the pelvic brim, directly facing the handle of the other blade, with which it is now to be locked, in order that traction may be made successively in the direction of the brim, cavity, and outlet, according to the rules already laid down.

FIG. 86.



Of course, deviations from the above rules may be necessary under certain circumstances, as in different positions of the head, or in face presentations; but these indications may safely be left to the operator, who, if cognizant of the true position of affairs, will readily understand any little change it may be necessary to make in consequence.

There are a few cautions necessary in the use of the long, which do not apply to the short forceps. They should not be used when there is a diameter of less than three inches and a quarter at the brim. In their introduction, if the os uteri be high up, great care is necessary in passing the points of the blades within the os, otherwise they are rather apt to slip into the cul-de-sac between the cervix and vagina, and it is in this way that with culpable ignorance serious injury has been inflicted in the shape of lacerations by forcibly pushing the instrument through the vaginal roof and into the peritoneal cavity. Some care is also required in locking them to avoid catching a portion of the soft parts in the lock, especially where the head is very high up, as this sometimes places the lock within the vagina. If, after some little force, the head does not descend, it is better to desist rather than run any risk of injury to the mother by laceration or bruising.

Sometimes the forceps are required to be applied to the head in some position other than those above described; the mode of their employment, however, will be just the same, differing merely in the direction of their application, according as we desire to seize and compress the head in the oblique, transverse, or antero-posterior diameter.

CHAPTER III.

INDUCTION OF PREMATURE LABOR.

THERE is probably no obstetric operation which, in its design and results, is more strictly preservative alike to mother and child than the operation for the induction of premature labor. It is avowedly resorted to only in cases where either there is good reason to anticipate a difficult and dangerous labor from pelvic distortion, or from severe contraction of some of the soft parts, arising from tumors or other organic diseases of the tissues; or from the existence of some serious and urgent disease on the part of the mother; or, lastly, from expected disease and death of the fœtus, which it is thus sought to avert.

This operation is usually performed at a period when it is supposed not only that the child will be born alive, but that it will also have the power of maintaining life, and this it can hardly do before the end of the seventh month. The object, then, is to save a child which otherwise could not be delivered without mutilation, except by the Cæsarean section; it is also done to spare the mother the dangers of a serious operation by substituting one of a much less dangerous character.

It must not be supposed, however, because the results are in a general way so satisfactory, that, therefore, there is no danger, and that, except in point of time, such cases are simply cases of natural labor at a different period of gestation. The issue raised is certainly more serious than that, for of a large number of cases, not much more than one-half of the children were saved, though, probably, all these would otherwise have perished; and, on the other hand, a certain though very small proportion of the mothers died.

It must be remembered, moreover, that where the operation is not performed, there is in most cases no other means of accomplishing delivery except by craniotomy, embryulcia, the Cæsarean section, or symphyseotomy, in all of which the mortality to the mother is very great, while most or all of the children are destroyed.

One source of danger to the mother arises, no doubt, from the fact that, the process being altogether non-natural—it being in truth a forestalling of nature, as it were—the organs and tissues involved are in a state of unpreparedness, and this fact alone suffices to explain why it is that dangerous consequences sometimes ensue.

Now, *the cases which require artificial premature labor are:*

1. Cases of pelvic distortion, where it would be impossible for a living child to be extracted at full time. We know that a pelvis which only gives a conjugate diameter of 3¼ inches will not as a general rule admit of the passage of a living child at term, supposing its head to be of average size. Where, therefore, the antero-posterior diameter measures only 3¼ inches and under, the case is certainly one for this operation, and it only remains to determine, according to the dimensions, at what period the labor ought to be brought on.

2. Cases of tumors of or in the pelvis, giving rise to similar obstruction. In the same category may also be included cases of contraction of the soft parts, arising from cicatrices of the vagina or cervix uteri, and cases also of cancer of those parts.

3. Cases in which there is evidence that on several previous occasions the death of the fœtus has occurred at a given time suddenly: here the operation would be resorted to prior to the period in question, with the view of preventing its recurrence.

4. Cases of certain diseases occurring in the course of gestation, and seriously interfering with the mother's health, such as long-continued and obstinate vomiting or purging, causing extreme weakness, emaciation, and danger to life. To these I may also add cases of placenta prævia, giving rise to sudden and severe attacks of hæmorrhage; cases of serious pulmonary or cardiac disease; cases of chorea, of albuminuria, induced apparently by pregnancy; and lastly, cases of convulsions, epilepsy, and the like.

The period at which the operation should be performed must necessarily be a variable one. The only rule which can be given is to defer it as long as possible with a due regard to the safety of the child, for whose sake chiefly the proceeding is adopted. An antero-posterior diameter of three inches would require delivery at least six weeks before full time; if the space was three and a half inches, a fortnight before term would suffice.

In deciding upon this question, however, the supposed viability of the child would, of course, materially influence our opinion, and, as a general rule, it may be said that a fœtus of 224 days, or 32 weeks, has a very good chance of life; of course every week beyond that time adds greatly to the chances of life, while every week short of it considerably lessens them. Probably it might be said that a period of 196 days, or 28 weeks, or 7 lunar months, is the border-land between safety and danger, as regards infantile life, with a strong bias to the latter.

But then comes the question, How are we to determine the period of fœtal life in any given case? I believe that the best answer to this question is to reckon the days, weeks, or lunar months, from the date of cessation of the last catamenial period, and then to deduct from 7 to 10 days from that date. If conception occurred before that time, it would still make only the slight difference of three or four days, and that would be unimportant, so far as any increased danger to the mother is concerned, while it would tell somewhat in favor of the viability of the child. If, on the other hand, impregnation occurred, not soon after the last menstrual period, but a short time before the one which was to have come on but did not, then such a mistake would still tell in favor of the mother, though somewhat to the detriment of the child.

Mode of Performing the Operation.—Having then determined upon the performance of the operation, and settled also the period at which, in the interests of both mother and child, the delivery ought to take place, the next and the all-important question now to determine is the way in which this shall be accomplished. In every case, of course, the object which we have in view is the promotion of uterine contraction, without which labor cannot be accomplished, and we may either aim at this directly by acting upon the nervous centre—the spinal cord—through the medium of the blood, as in the administration of various drugs, ergot, borax, rue, and such like; or we may indirectly stimulate the utero-spinal nerves by operative measures upon the uterus or its contents, as in rupturing the membranes, dilating the os uteri; separating the membranes; vaginal, uterine, or rectal injections; and the introduction and retention of some foreign body into the uterus. These several measures act somewhat variously, and are of very different values: some possess great power, while others are almost useless.

1. Formerly one method only was in general use, viz., punc-

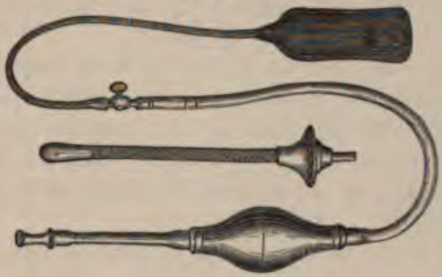
turing the membranes and allowing the liquor amnii to drain off; in this case the uterus gradually contracts on its diminished and diminishing contents, the os in consequence slowly dilates, and delivery is ultimately accomplished. This proceeding is still adopted by many, and an instrument has been made expressly for the purpose; but a common male elastic catheter answers perfectly well; about half an inch should be cut off its upper extremity; it should then be passed within the os uteri up to the membranes, and the common wire stilet thrust through it will effect all that is desired; the liquor amnii will slowly drain away, and after twelve, twenty-four, forty-eight, or more hours, labor will gradually come on. Sometimes it seems better to puncture the membranes high up, so that the liquor amnii may drain away still more slowly and gradually; in that case the catheter and stilet must be passed beyond the cervix; but this is a much more difficult proceeding, while the advantages are certainly not very apparent. Uterine action may often be expedited by administering a powerful purge, such as aloes, jalap, scammony, etc.; and, according to the late Dr. Rigby, it will be facilitated by rubbing over the abdomen, before puncturing the membranes, some stimulating embrocation, and giving internally a few doses of the secale cornutum, with or without borax, which seems to possess properties similar to the ergot. Dr. Rigby strongly advocated such a plan as being sure to excite uterine action; the parts thus become better adapted to the performance of labor, which the puncture of the membranes will now suffice to bring about.

The great objection to this proceeding is that it exactly reverses the order of nature, for, whereas nature decrees dilatation first, and evacuation afterwards, art in this method aims at evacuation first, and dilatation afterwards. Moreover, this reversal leads to yet further evils: it certainly prolongs the labor, and puts the life of the child in danger; while, from the absence of the soft dilating bag of membranes, it renders the labor more painful by reason of the pressure of the hard head of the child upon the undilated and perhaps unyielding os uteri.

2. A second and much more satisfactory plan is, to begin by dilating the os uteri; and perhaps the best means of doing this is by the introduction of a sea-tangle or sponge-tent; this, according to the late Sir James Simpson and others, seldom or never fails, while it possesses the great advantage of preserving the membranes entire; a matter really of very great moment, for by

it the labor is rendered much more natural, and far less painful to the mother. The pressure of the head upon the undilated os, in the absence of the soft bag of membranes, often gives rise, as I have already said, to most painful, and apparently spasmodic action of the uterus. Besides the introduction of the sponge-tent, Sir James Simpson used to inject warm water into the vagina, for the purpose of swelling the sponge, and to soften the maternal passages. Of the two agents mentioned, undoubtedly the sea-tangle is the best; it expands more slowly, sets up less irritation, and if perforated, as they now generally are, discharges may readily pass away. It should be understood that these sea-tangle tents are to be used only as a preliminary mode of dilating, for we possess in the dilating india-rubber bags a much better, safer, and more reliable instrument than either the sponge or sea-tangle, when once the cervix has been slightly opened, so as to admit of the easy application of the bag. Drs. Keiller and Graham Weir of Edinburgh, Mr. Jardine Murray of Brighton, and Dr. Barnes seem all to have been at work at this subject at about the same time, and from all accounts it seems difficult to determine the question of priority of invention, for all seem to lay claim to them. In Fig. 87 is represented the bag in question, which is seen to be more or less fiddle-shaped, and to it is attached the syringe, by means of which air or water may be injected into the bag.

FIG. 87.



These bags are made of several sizes, the smallest being about the size of the finger, the largest with a diameter of fully two inches in the smallest part, and all have a constriction in the middle which is intended to be grasped by the os uteri, and so to be kept *in situ*. Either air or water may be used for distension. I have generally adopted the former. The bag is to be passed up into the cervix uteri, previously well greased; a long elastic tube is attached to the lower end of the bag, with a stopcock at its extreme end; when *in situ* the bag may be distended by an air syringe, or water may be injected into it, and in either case the cervix readily yields to what is in fact a very near resemblance to the natural bag of membranes. Dr. Barnes writes, "By its aid it is very possible, in many cases, to expand the cervix sufficiently to admit of delivery within an hour, although generally it is desirable to expend more time. I have completed delivery in five hours, in four hours, and even in one hour from the commencement of my proceedings. In many cases of placenta prævia, where there was scarcely any cervical dilatation, I have effected full dilatation in half an hour."

No one can doubt that we possess in these instruments a most valuable agent for our purpose, one with which we can almost, if not quite, determine any given case of premature labor at a fixed period; not only so, but the instrument itself can be used with great facility, and its employment is almost absolutely free from any risk of injury.

3. A third plan is to separate the membranes either from the region of the os and cervix uteri for a distance of about three inches all round, or, as has been lately very strongly recommended by my friend Prof. Lazarewitch, from the fundus uteri. The former may be done either by forcibly injecting a stream of warm water between the uterus and the membranes, by means of an elastic or other syringe, or by passing an elastic catheter, or the uterine sound, round the cervix in the position indicated. This latter step I have adopted on several occasions, and with very good results: labor usually begins in from twelve to twenty-four hours at most; but I have always observed that the larger the extent of separation effected between the membranes and the uterus, or rather, perhaps I ought to say, the nearer the separation is to the fundus uteri, the quicker does uterine action set in, and the sooner is the labor accomplished.

The method practiced by Prof. Lazarewitch is based upon the following assumptions: 1. That separation of the membranes from the uterus is always the first step in the process of parturition; 2. That this separation begins at the fundus uteri, or at all events, uterine action is not set up until that takes place; and 3. That uterine contractions begin at the fundus. Therefore, in order to imitate the natural process as far as possible, he makes use of a syringe, to which is attached a long tube capable of eaching nearly as far as the fundus uteri; having inserted the ube nearly its whole length within the cervix, he injects from about six ounces to nine ounces of warm water directly up towards the fundus, and the results in twelve cases are thus described: Ten required only one injection, and in the other two a second injection was resorted to only for the purpose of increasing the labor-pains. Uterine action commenced almost immediately, and the mean of twelve cases gave an average duration of about nineteen hours. None of the mothers died from the operation: one only of the children was still born, and two died before the operation; all the rest were born alive. No preliminary measures were adopted, and "in all the cases the operation was made with the greatest ease, without causing pain."

Now, it must be admitted that this success is very great; but, on the other hand, I am bound to add that many authorities regard this proceeding as a very dangerous one; and undoubtedly, in some cases where the uterine douche has been employed, death has occurred almost immediately. Whether such a result is due to shock, or to the injection of air into the uterine veins, or to any other cause, is not certainly known; but that such a result should be possible is a serious objection to its employment. Speaking from my own experience, I should say that it is extremely efficacious, for in three cases in which I have resorted to it, labor set in almost immediately, and continued to the end; but in one case, as soon as I had injected, the patient was seized with the most serious distress, with extreme dyspnœa, and at first I feared she would die; however, the attack passed off in about twenty minutes, and then all went well.

4. Among other methods which have been strongly recommended by their respective inventors I may mention the vaginal douche; and the insertion and retention of some foreign body within the uterus. Both of these are probably safe, but both are also tedious, the former more particularly. It consists in the forcible injection into the vagina and against the cervix uteri of a pint or two of tepid water, which may be repeated two or three times a day till uterine action is set up. In the latter case an elastic catheter, or bougie, or other foreign body is introduced about five or six inches into the uterus, and left there until it also sets up uterine action. In some cases this occurs speedily; in others, many hours elapse before any result is apparent. Dr. Barnes believes that, "No other method combines safety and cer-

tainty in an equal degree;" but with this opinion I cannot entirely agree, for I have known it to fail in several instances. Great care should be taken whenever an instrument is passed into the uterus, to avoid, if possible, injuring the placenta.

Lastly. Galvanism, stimulating applications to the breasts, the administration of ergot of rye, and other oxytoxic agents, and the local application of the extract of belladonna to the cervix uteri, have also been recommended, but they are one and all uncertain, not to say injurious in their action; and by the other means I have enumerated, but especially by that of separating the membranes, and subsequently dilating the cervix uteri, we are pretty certain of success.

These, then, are the several modes by which the induction of premature labor may be secured. Much may, no doubt, be said for each of them, but this at least is clear, that no one possesses the element of absolute certainty. I have tried most, if not all of them, either singly or combined, and the general result of my experience, which extends now to a considerable number of cases, has led to the adoption of the following plan, which I can recommend as in general highly successful. Last year I had no less than four cases in one month, all of which were treated by this plan, and all ended successfully to both mother and child. First, I take good care to secure complete evacuation of the bowels, both by injection and by the administration of an aperient by the mouth. I then introduce a sea-tangle tent, of about the size of No. 7 catheter. This will dilate the os sufficiently to admit the smallest size india-rubber bag; in five or six hours this may be withdrawn and the next size applied, to be followed by one still larger; sometimes this alone suffices to excite uterine action; if not, then I introduce an elastic bougie or catheter into the uterus, taking care not to rupture the membranes, but to pass it up between the uterus and membranes. By this time the cervix is probably dilated to at least the size of a five-shilling piece, and the labor is therefore so far on its way. The bougie now generally sets up uterine action in a very few hours, and this being established, it will probably be completed very speedily. Any complications which may arise will of course be met by the means recommended for them under ordinary circumstances, and these should always be borne in mind when determining on the question of performing this operation, that we have in them so many adjuvants for the successful termination of these cases.

CHAPTER IV.

TURNING.

Of all obstetric operations there is probably none which is capable of effecting so great a saving of human life as the operation of *Turning*. Its applicability has certainly a wider range than any similar proceeding; and it is excluded only by the existence of a pelvic diameter of less than three inches.

Version or turning, has been defined as "that manual operation by which one presentation is substituted for another less favorable;" it is of two kinds,—podalic and cephalic. Within the last half century it has been much more frequently resorted to than formerly; and quite recently attempts have been made to render it still more common. According to Dr. Churchill, whose zeal for statistics is most unbounded, the records of English practice yield in 82,696 cases, 318 cases of version, or about 1 in 220½; in French practice, of 40,376 cases there were 451 cases of version, or about 1 in 89½; and in German practice, of 403,976 cases, there were 3493 cases of version, or 1 in 115⅔. The whole number of cases is 527,050, and of these there were 4262 cases of version, or about 1 in 123⅓.

The nearest estimate he could form of the mortality gave 219 maternal deaths in 3350 cases; or 1 in 15, and 1616 fœtal deaths in 3753, or rather more than 1 in 2½. It must be remembered, however, that the circumstances requiring this proceeding are often very dangerous, and most likely this would account for a great deal of the mortality. For assuredly the operation itself cannot be considered a very dangerous one to the mother if it be properly performed.

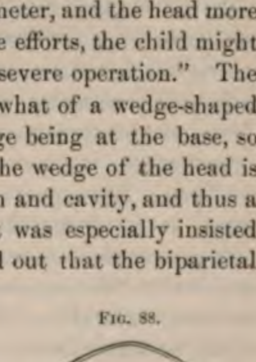
Cephalic version, if so fine a name may be given to so trivial a proceeding, consists in removing any obstruction to the engagement of the pelvis by the head, seizing the latter, altering its position, and bringing it down. Flamant, who was probably the first to perform this operation, appears at first to have accomplished it chiefly, if not entirely, by external manipulation, but he subsequently resorted to internal proceedings, and probably may in some cases have combined both methods. Other German observers have since his time frequently practiced cephalic version. Yet, strange to say, though it is not difficult of performance, and may often be attended with the happiest results, it is still very seldom resorted to. It may, however, be usefully attempted in many cases of simple cranial malposition, and in some other malpresentations, as that of the neck, shoulder, or even of the arm, provided always that the membranes are entire, and that the pelvis is of normal size. Cephalic is far less fatal to the child than podalic version, but it is necessarily more tedious in delivery. Cephalic version may be performed also in cases of forehead or face presentation, and where some other portion of the child presents as well as the head, such as the funis, the hand or arm, and even perhaps in some cases of placenta prævia.

The method of operating, or rather the different steps in the process of converting a given malpresentation into an ordinary cranial presentation, must necessarily vary with the nature of each special case. In all, we should be careful to secure as much muscular relaxation as possible by placing the patient on her back with the legs drawn up, and in the intervals between the pains, we may possibly succeed by external manipulation alone in correcting cases of fœtal obliquity, and even of shoulder presentation, provided only that the uterus is relaxed, and especially that the membranes are entire, and the liquor amnii present. Sometimes in cases of uterine obliquity, where the child lies with its head resting on one or other ilium, it is well to turn the patient over to the same side as that in which the head is placed; in this way the breech at the fundus rolls down as it were to the side which is most depending. "This will act as a lever upon the uterine ovoid, and raise the lower or head end of the uterus, so as to facilitate its return to the brim." (*Barnes.*) The uterus should now be kept fixedly in this place, and a very little internal manipulation will suffice to bring the head into its proper position. As soon as this is secured the membranes should be ruptured, the uterus will speedily contract, and thus the normal position will be maintained. Pressure, by means of a pad or cushion in either iliac fossa, will prevent the head from again passing in that direction, and if the labor now progresses the operation will be certainly successful. If it goes on languidly and the uterus still seems obliquely inclined, it will be better to apply the forceps at once, and so to secûre the head in the position desired.

Where the hand is presenting either with or without the head, the former must be pushed up and the head pressed down by external manipulation, care being also taken in regard to the position of the patient, according to the observed tendency of the case. The same remarks apply to the case of funis presentation; we should pass the cord up and press the head down, applying the forceps, if necessary, to complete delivery speedily.

Podalic version consists in introducing the hand into the uterus, seizing one or both feet, and bringing them down for the purpose of delivering with that extremity. It is applicable to presentations of the upper extremity or of the trunk, to certain cases of face presentation, of misdirection of the axes of the child and pelvis, from a pendulous condition of the abdomen, in which, though the head presents, it cannot be reached by the forceps owing to the obliquity above named. Also to cases of placenta prævia, convulsions, rupture of the uterus, prolapse of the cord, death of the mother, or other sudden accidental complication; and in certain cases of pelvic deformity, where craniotomy would otherwise be required "on the grounds that the base of the skull being narrower than the interparietal diameter, and the head more compressible under tractile than expulsive efforts, the child might be delivered, and perhaps saved, by a less severe operation." The head, in fact, on section represents somewhat of a wedge-shaped body, the apex or thin edge of the wedge being at the base, so that in podalic version the thin end of the wedge of the head is the part that first engages the pelvic brim and cavity, and thus a great advantage is obtained. This point was especially insisted upon by Sir James Simpson, who pointed out that the biparietal diameter (*a*, *a*, Fig. 88), is greater than the bimastoid (*b*, *b*, Fig. 88), by half or three-quarters of an inch, and while the latter is practically incompressible, the former, on the contrary, may be compressed to a rather considerable extent, even to as much as an inch, provided the compressing force is gradually exerted; indeed, some authorities have even thought that it could be compressed to a still greater extent. Now, when turning is effected, this compression is exerted, and the result is something like that represented in the subjoined sketch (Fig. 89),

FIG. 88.



where the dotted line, *a*, *a*, shows the normal shape of the head, and 1, 1, 2, the shape which the head is made to assume by being drawn through the pelvis; whereas in Fig. 90 the dotted outline,

FIG. 89.

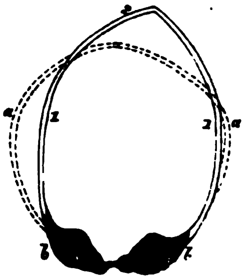
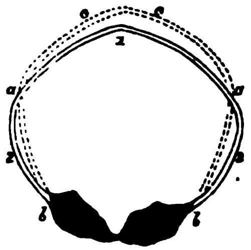


FIG. 90.



a, *a*, *b*, *b*, *c*, *c*, shows the normal shape of the head, and 1, 2, 2, the shape resulting from pressure on the vertex, by which it will be seen that the result is to widen the biparietal diameter. These illustrations are taken from the late Dr. Tyler Smith's work.

In the sudden and accidental complications referred to the sooner turning is effected the better. Where the os is undilated and rigid, chloroform will be found invaluable, or a pretty copious and rapid venesection will generally suffice to secure dilatation. If we have longer time at command, tartar emetic, in full doses, is preferable. In cases of flooding, the os will not long remain undilated. As a general rule, turning ought not to be attempted unless the os is fully dilated or is soft and dilatable, and the other soft parts are in the same condition. It is much easier of performance before the membranes have ruptured and the liquor amnii has escaped, and the difficulty increases in proportion to the time which has elapsed since this took place. At the same time we must of course be prepared to operate even though there be no liquor amnii present. In some rare cases the presence of the liquor amnii when it is in great excess is rather detrimental than otherwise, for the child rolls about so readily that it is difficult to fix it with a view to secure a breech presentation. This applies especially to cases where we wish to turn by the combined internal and external method without actually introducing the hand into the uterus.

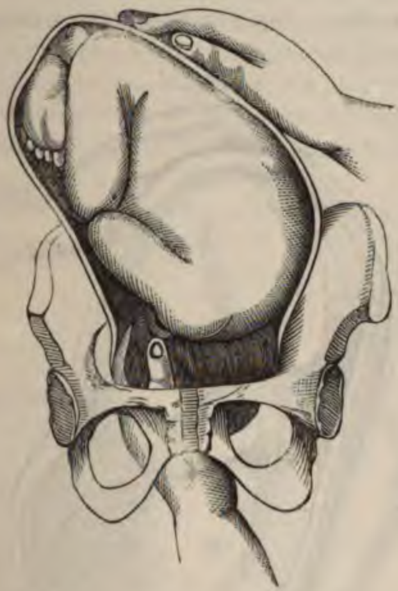
Of course the pelvis must be sufficiently roomy to admit of delivery without injury to the child by laceration. The child also, or its presenting part, must not have descended too low or have become wedged in the pelvic cavity. The best time, therefore, for performing the operation is when the os is fully dilated and the membranes entire; and no time should be lost if the latter have just ruptured and the os is dilatable. The worst cases are those arm presentations where "the membranes have been a long time ruptured, the waters totally evacuated, and the womb closely contracted around the fœtus, which is then thrust considerably into the pelvis, the parts of the woman being dry, hot, tender, and often in a state of inflammation and tumefaction, especially when unskilful endeavors have been used to extract or turn the fœtus, or to dilate the parts." Under these circumstances the child is pretty certain to be dead; and our chief object, therefore, in resorting to this proceeding will no longer hold good. Moreover, the danger to the mother in such a condition is by no means light.

Mode of Operating.—The patient should be placed in the usual obstetric position, on the left side, with the legs well drawn up to the abdomen, the right leg raised, and the knees separated; the nates also should be close to the edge of the bed, if not a little beyond it, and the head and upper part of the trunk should be on a level with the pelvis; the bladder and rectum should be previously emptied, and the arm of the practitioner completely bared; that one may be used which suits his own convenience best—the right I have most frequently employed in the more common cases of turning where the hand must really be introduced into the interior of the uterus: this I have found very convenient for all steps of the process, but it is merely a question of convenience, and may be left to the will of the operator, though practically he will find that the right hand goes best in all abdomino-anterior presentations, while the left hand goes best when the child is in the opposite position. Where, however, the operator intends to perform the bimanual, bipolar, or combined internal and external method, then the right hand will probably be found of most service, and its use, therefore, will be more convenient on the outside of the abdomen, because there it finds most work to do: accordingly, in such a case the left hand should be introduced into the vagina. But whichever hand be used internally, it should, especially in cold weather, be carefully warmed, and oiled all over, except on the palmar surface of the hand. There is one rule which has been laid down for guidance in determining which hand to use, having reference to facility in application; it is this, —always to apply the hand corresponding to the one which presents, right to right, left to left, just as we do in ordinary shaking of hands; in fact, it will practically be found convenient to adopt this as our rule in cases of turning. The observance of this rule is convenient also in compelling accuracy of diagnosis as to presentation. Dr. Barnes, in his valuable work, to which I have before referred, gives the following rules on this subject: "In all dorso-anterior positions, lay the patient on her left side; pass your left hand into the uterus—it will pass most easily along the curve of the sacrum and the child's abdomen; your right hand is passed between the mother's thighs to support the uterus externally. In the case of abdomino-anterior positions, lay the patient on her back, and you may introduce your right hand, using the left hand to support the uterus externally." By this rule it will be seen that we are always to pass the hand on the anterior or abdominal aspect of the child, and that hand is to be used the palmar surface of which is most readily and easily applied to the anterior or abdominal surface of the child. The position of the patient also governs the question of which hand is to be introduced, as is pointed out in the rule laid down by Dr. Barnes.

In introducing the hand, which should only be attempted in the intervals between the pains, the fingers should be brought into the form of a cone, and gradually, by a screw-like movement, be passed into the vagina, straightening the hand as the knuckles pass the external orifice, as this is usually the most painful part of the proceeding, and the projecting knuckles increase the difficulty and suffering. This done, the tips of the fingers must very cautiously and gently pass the os uteri; the hand, slowly feeling its way and adapting itself to the curve of the passages, must, by a sort of semi-rotatory backward and forward movement, be gradually pressed onwards into the uterine cavity. The proceedings should be stopped during uterine action. More care and time will of course be requisite where the os is not fully dilated, but under any circumstances too great care cannot be exercised. Some assistance will be rendered by either the nurse supporting and gently pressing down the fundus and anterior part of the uterus, or by the operator placing one hand in that situation, as is represented in the drawing, Fig. 91. Here the left hand is used internally, and is represented as just passing the pelvic brim, while the right hand is outside over the fundus to steady the uterus and to help in the process of evolution.

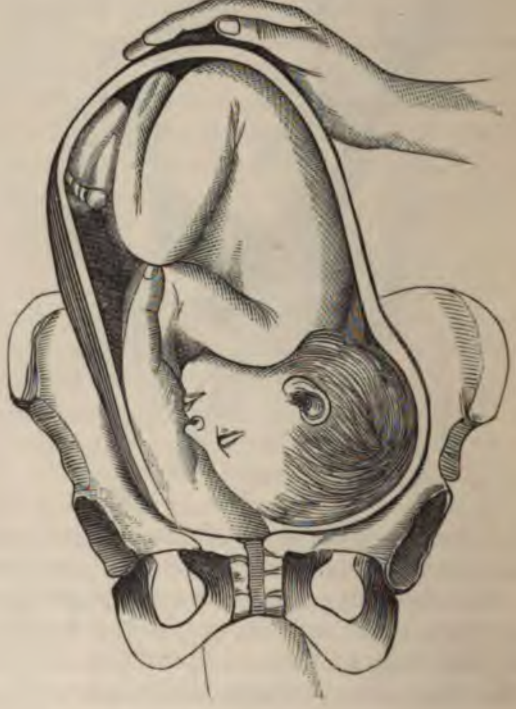
Probably the first great difficulty we shall meet with, especially in cases of arm or shoulder presentation, will be at the brim of the pelvis. Sometimes we may avoid this by passing one or two fingers into the uterus, and pushing the head away towards one or other iliac fossa; or we may adopt the practice or Levret, viz., grasp the shoulder or chest, and, as it were, lift the child out of the pelvic brim and push it aside a little, aiding this movement at the same time by external manipulation with the other hand.

FIG. 91.



When the brim is passed, if the membranes are entire, every possible care should be taken to prevent their rupturing, and the hand, with the fingers expanded and flattened, should be gradually and carefully insinuated between them and the uterine wall, pressing onwards until near the place where the feet may be expected: then one or two fingers may be pressed into the cavity of the amnion, the membranes being in this way ruptured, or they may be picked through with the thumb and forefinger nail; no water will escape, as the os and vagina will be closely filled the arm of the operator; the hand must then be inserted throu the rent into the amniotic cavity, and search be made for feet: there will be no difficulty in moving the hand freely in a direction. Here, as at other times during the operation, the currence of uterine action requires that all proceedings should stopped for the time. Fig. 92 represents this stage in the ope tion: the hand is within the amniotic cavity and is being on past the upper extremity, which, by the pointed shape a of the olecranon process of the ulna, as compared with the and flatter outline of the knee, is readily recognized an guished.

FIG. 92.

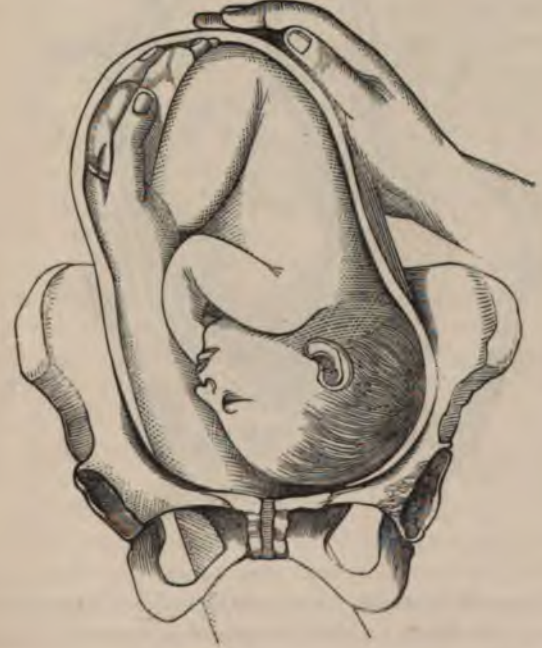


In introducing the hand we should feel for the anterio of the child, as not only is the passage of the arm easie direction, but the facility for finding the knee or fo greater, as they are sure to be in this situation. When the arm presents, of course this will guide us to the chest and abdomen; the palm of the presenting hand usually looks in the same direction as the anterior surface of the child.

As soon as the hand and arm are fairly within the uterine cavity, we must, as it were, with the mental eye, look about to find the foot or knee by which to perform the version and subsequent extraction. And here it is that the greatest caution is necessary in order not to mistake the one for the other, lest perchânce, when the part we have laid hold of is brought down, we find to our dismay that it is the upper in place of the lower extremity.

Now the chief differences between the elbow and knee, and the hand and foot, are these: the knee is larger, rounder, and, as it were, more square than the elbow, which, on the other hand, is more angular, sharper, and smaller than the knee. On the knee, the patella, movable or immovable, may be felt; on the elbow we

FIG. 93.



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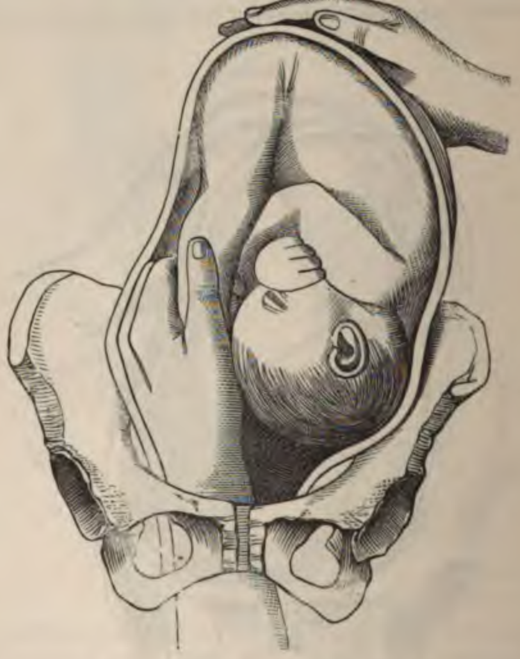
get the olecranon process. "We distinguish a knee from an elbow by there being two rounded prominences (condyles), with a depression between them; the elbows present also two similar prominences, but there is a sharp projection (olecranon) between them." In the case of the hand *versus* the foot, we find that the fingers are longer and more uniform in length in the former, than the toes in the latter. The thumb is much more apart from the rest of the fingers than the big toe from its companions; and lastly, the fingers can be easily folded on the hand, while the toes scarcely admit of any flexion on the foot. There is, perhaps, equal danger in mistaking the ankle for the elbow-joint, which it in many respects resembles: the condyles of the former are very like those of the latter; while the olecranon process of the latter closely resembles the os calcis in the former.

FIG. 94.



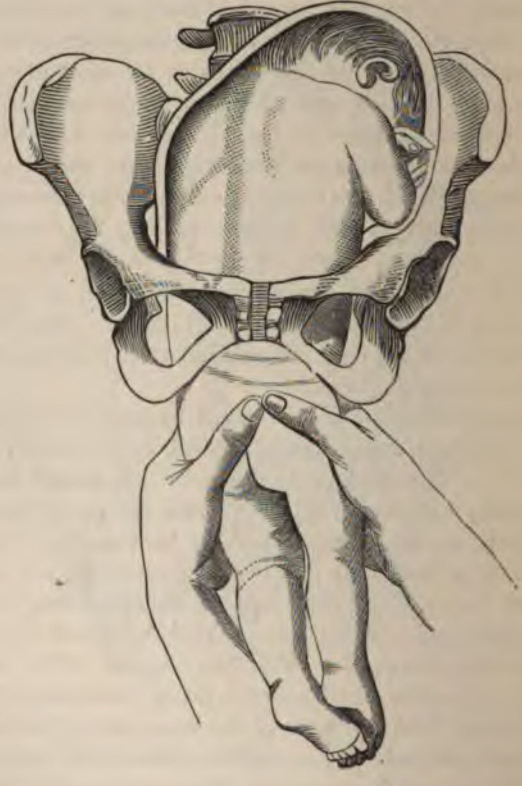
Knowing, then, well the resemblances and differences of the parts with which the hand is likely to come into contact in the cavity of the uterus, we have next to determine what part we en-tend to turn by: shall we seize one only or both of the lower extremities? and if either, shall we seek for the knee or ankle by preference? This question has been much disputed by obstetric authorities, and different opinions are still advocated by them. But, speaking from my own experience alone, I have no hesitation in recommending that, as a general rule, one knee only should be laid hold of for this purpose. Not only is this part reached earlier, and therefore easier, than the foot, but it is also more easily held, a better purchase is obtained, and version is more readily accomplished.

Then, as to which knee, or foot if it be preferred, we should seize, probably the rule which was laid down by Sir James Simpson is the best, viz., to take the one on the opposite side to that of the presenting part; by this means we act most directly and effectually upon this part, causing it to recede as traction is made; whereas, if we draw down the leg of the same side as the presentation, then we approximate these two parts, and though version may be completed, it is certainly not so readily accomplished, and it is very likely to fail altogether. Fig. 94 represents the hand of the operator just seizing the feet of the child. It will be observed in all these figures that the child is presenting cranially, and in the first oblique position; the arm is accordingly introduced in the right oblique diameter, so as to pass along the anterior aspect of the child.

When once the foot or knee is seized by passing the forefinger round its popliteal aspect, the child will be very easily turned, and the arm of the operator at the same time should be slowly and cautiously withdrawn, bringing down the leg or legs of the child, with the anterior surface looking backwards. Care must also be taken to bring the feet over the abdomen, and not over the back of the child. As the legs are brought down, the head, or other presenting part recedes. This is very well represented in the preceding illustration (Fig. 94), where it will be observed that the two legs are seized and are being brought down along the front of the child, the head at the same time is gradually receding, having already got completely free of the pelvic brim. The pelvis of the child engages the brim transversely, the liquor amnii escapes, the uterus contracts firmly on the child, and the case may now be left to nature. "As the feet descend toward the os uteri, the presenting part, particularly if the arm has been prolapsed into the vagina, begins to recede, the hand externally will assist in moving the child round, and we should perform this step of the operation so gradually as to be assured that the presenting part has quitted the pelvis before the feet have entered. Without attention to this point, the child may easily be fixed across the upper part of the pelvis, or even the body brought down, while the head is wedged into the cavitas iliaca of the ilium, and produce a serious obstacle to its further advance" (*Rigby*).

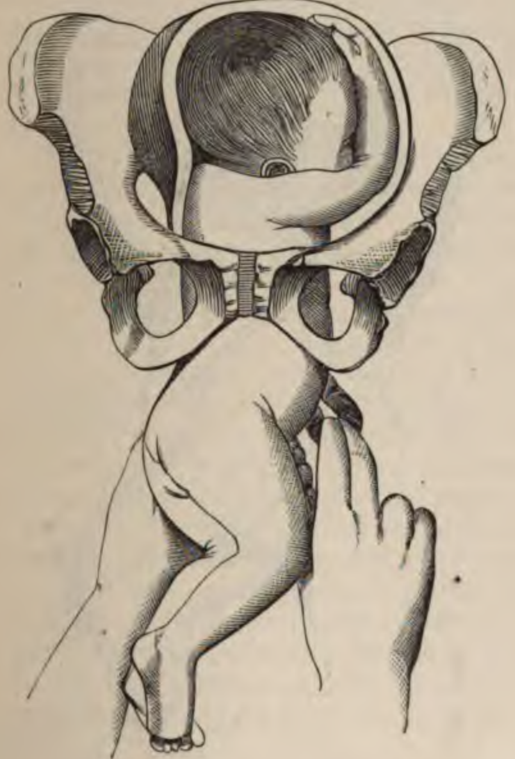
As soon as the buttocks are fairly born, the shoulders will be entering the brim, and as the head soon follows, slight attempts must be made to turn the child gently, so that the head may enter with its long diameter transversely. In Fig. 95 this process is represented as being accomplished; the child is held with both hands, while some traction is made in a more or less rotatory

Fig. 95.



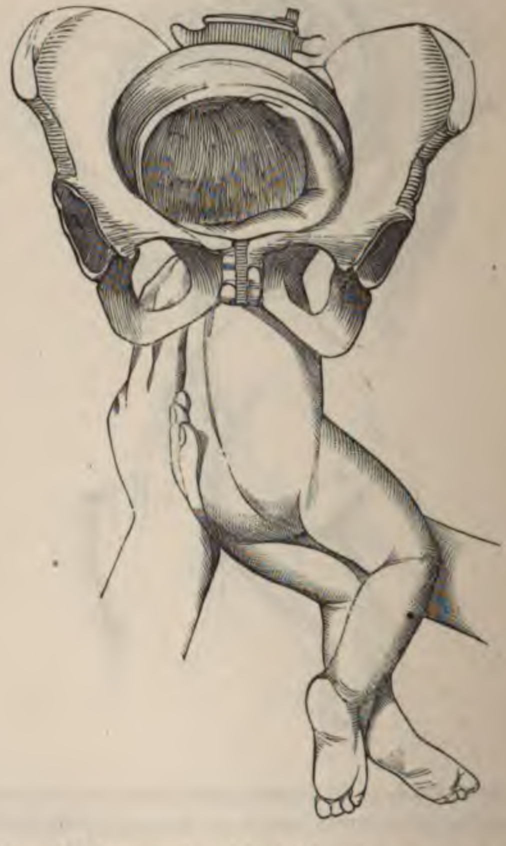
manner, and at the same time, as the child descends, it makes a greater turn, thus bringing the longitudinal diameter of the head into the transverse diameter of the pelvis. When this movement is being effected the cord should be guided to one or other sacro-iliac synchondrosis, in order that it may there be out of the reach of compression, and as the further descent of the child is effected, so soon as the root of the cord is external to the vulva, a small loop of it should be drawn down very gently, as is represented in Fig. 96. This is done partly to avoid compression, but chiefly to avert any stretching of that part, which may not only act injuriously upon the circulation, and so endanger the child's life, but it is thought by some may give rise to inversion of the uterus, and is very likely to detach some portion of the placenta, and so give

FIG. 96.



rise to hæmorrhage. There is, however, no need for, but rather danger in hastening this stage; the uterus contracts and expels the child better the less it is interfered with. As the head descends it gradually turns round, so that the face comes to occupy the hollow of the sacrum, and the back curves under the pubis. The long diameter of the head is now in the antero-posterior diameter of the cavity of the pelvis, but the face is the most depending part—it is low down in the curve of the sacrum, while the occiput is behind the symphysis pubis, if it be not a little above it, as is seen in the annexed illustration (Fig. 97). At this stage both arms will probably remain with the head at, or even above, the brim of the pelvis. Two fingers of the left hand (see Fig. 97)

FIG. 97.



should now be passed up over the left shoulder and along the upper arm to the elbow, the arm of the child being meanwhile pressed over the chest while the forefinger of the operator now makes traction upon the child's arm in the elbow-joint, so as to dislodge it and bring it down. Care, however, is necessary at this stage not to exert too much force, for I have known the humerus broken by it in the process of extraction, and in practice such an accident would properly be held to reflect much discredit upon its author.

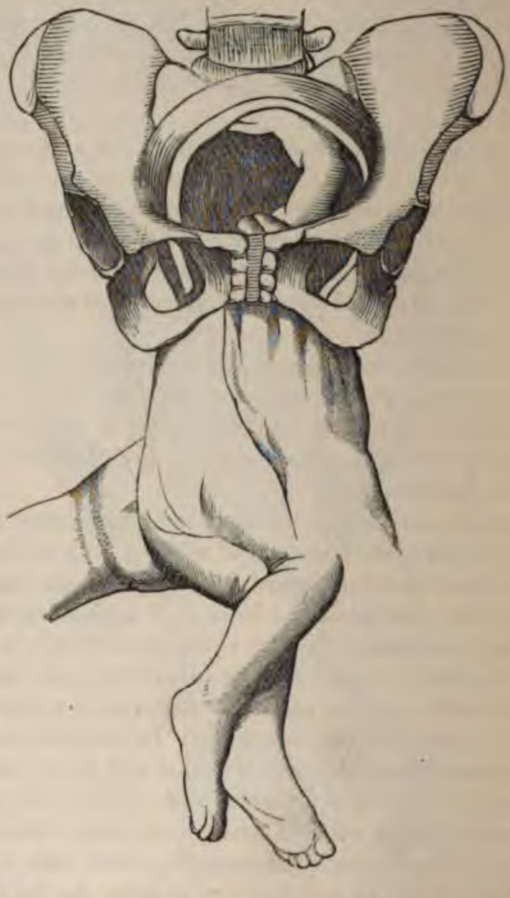
When the left arm is drawn down, the child may make a very slight turn to the left, so as to bring its right arm a little anteriorly towards the symphysis pubis, as is represented in the subjoined sketch (Fig. 98). One or two fingers of the right hand should then be passed under the pubic arch up to the right shoulder, so as to effect its delivery in the same way as was done with the opposite arm.

After this, with some traction, the head will probably soon descend, but should the passage of it be delayed, and supposing that the child is living, we ought certainly to apply the forceps and terminate delivery, so as to prevent any ill effects from pressure on the umbilical cord.

In ordinary cases, where the membranes are entire, and the os uteri fully dilated, the operation of turning is by no means difficult; but where the liquor amnii has escaped some time, and the os is not only undilated, but hard and unyielding, the uterus being firmly contracted over the child, the difficulty is often immense. In such a case bleeding to syncope has been recommended in order to soften and dilate the orifice: tartar emetic is sometimes given; or chloroform may be administered for the same purpose, after which a full opiate will be of service, and the operation may then be attempted. If, as will sometimes happen, especially in cases of arm presentation where the limb protrudes, the operation is unsuccessful, either from inability to introduce the hand, or to effect version when the feet have been reached, there is then nothing left but to perform embryulcia, or craniotomy, etc.

In regard to the rule "never to bring down more than one foot in the manual operation of turning a child," it may be remarked that this more nearly resembles the ordinary breech presentation; and in these cases, as is well known, the mortality to the child is very much less than in the operation of turning and bringing down both feet. The principal cause of danger to the chil arises, no doubt, from pressure on the umbilical cord, and thoug this may take place to a fatal extent during the passage of t

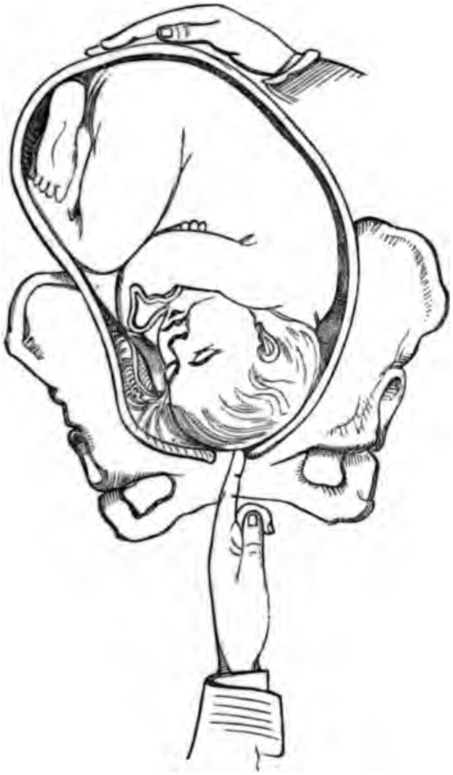
Fig. 98.



pelvis, it is much more likely to happen during the passage the head: hence the rule to apply the forceps if there be mu delay at this stage. Where only one leg is brought down, it thought that the remaining one serves to protect the cord fr undue pressure, but this it cannot do during the passage of t head.

There is yet another mode of effecting delivery by turning, which Dr. Braxton Hicks (who first performed and fully described the operation) has given the name of "combined external and internal version." As its name implies, the operation consists of both internal and external manipulations, without the actual introduction of the hand and arm into the uterus. It had long been known that the position of the fœtus in utero could be very much changed by the use merely of one or two fingers in the os uteri, and without introducing the entire hand and arm—a proceeding which is often difficult, generally painful, and sometimes even dangerous. It had also been demonstrated, chiefly if not entirely by the Germans, that the child could be moved in utero, and its position rectified in certain malpresentations by merely external manipulations; this practice, however, had been

FIG. 99.

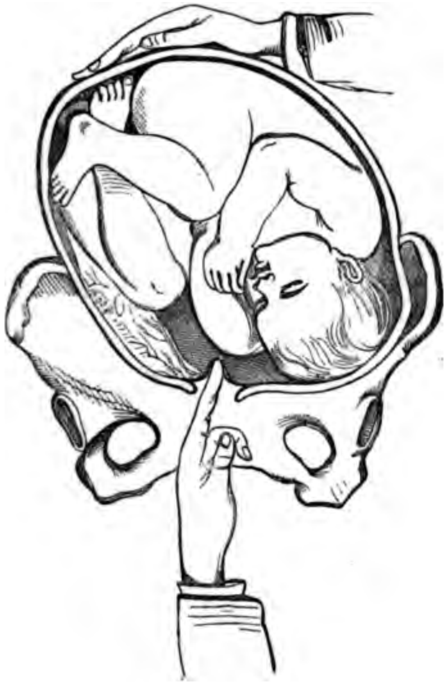


resorted to only before the commencement of labor. Dr. Braxton Hicks, on the other hand, very happily combined these two methods, and showed their applicability to the emergencies of actual labor. He grounded this practice upon the facts, first, that the fœtus in utero is very easily acted upon from without; secondly, "that when the child is placed transversely in the uterus, the knee, in its natural position at the umbilical region of the child, is nearly immediately over the os uteri, and therefore within a finger's length of it; and that also in the natural position the foot is close to the breech, and will be found upon it when that end of the child presents. Hence, should we succeed by any means to place the fœtus transversely in the uterus, the principal difficulty in version is overcome." Lastly, he states, "that when the child is transversely placed in the uterus—that is, with its long axis at right angles to that of the uterus—there is a great tendency for it to assume a position in which their long axes will become coincident; or, in other words, when the child is transversely placed, a very slight force will be sufficient to determine which direction the head shall take, either back to the os, or upwards to the fundus."

The successive steps of the operation are thus described by Dr. Hicks: "Having lubricated my left hand, I introduce it as far into the vagina as is necessary in order to reach a finger's length within the cervix; sometimes it requires the whole hand, sometimes three or four fingers will be sufficient in the vagina. Having clearly made out the head and its direction, whether to one side or other of the os uteri, I place my right hand on the abdomen of the patient towards the fundus (Fig. 99). I then endeavor to make out the breech, which is seldom a difficult matter. The external hand then presses gently but firmly the breech to the right side; as it recedes, so the hand follows it either by gentle palpations, or by a kind of gliding movement over the integuments, while, at the same time, the other hand pushes up the head in the opposite direction, so as to raise it above the brim.

"When the breech has arrived at about the transverse diameter of the uterus, the head will have cleared the brim, and the shoulder will be opposite the os (Fig. 100). That is pushed on in like manner as the head, and after a little further depression of the breech from the outside, the knee touches the finger and can be hooked down by it (Fig. 101). Should it be difficult to hook down the knee, depress the breech still more, and it will be almost always the case that the foot will be at hand." Again, "Should the child face towards the left side, the only difference required in operating is, that the breech be pressed towards the left side and the head to the right."

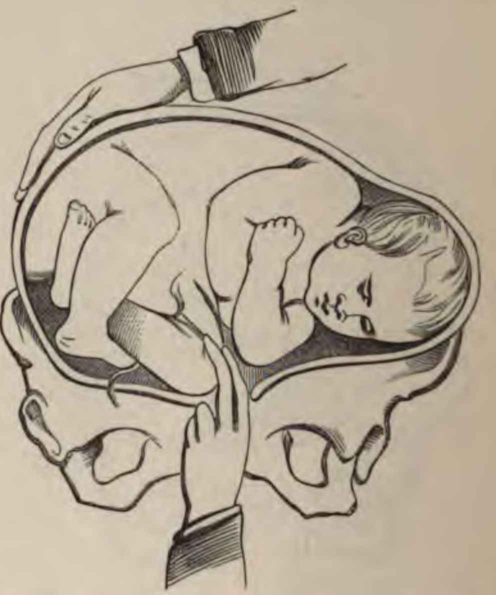
FIG. 100.



In this, as in other methods of version, we should endeavor to limit our manipulations to the intervals between the pains, as the child can be moved much more readily then than when the uterus is firmly contracted upon it.

The advantage of this mode of operating in all cases where it is applicable is sufficiently apparent. The difficulty, trouble, and suffering necessarily incident to the introduction of the entire hand and arm into the uterus is thus entirely saved. Moreover, it can be performed at a very early period in the labor, when the os is but slightly dilated; as soon, therefore, as the malpresentation is diagnosed, and long before the child has become fixed in its evil position—in such cases as arm, shoulder, neck, and transverse presentations—this is of the utmost importance; so also in cases of convulsions, where the introduction of the hand and arm seems often to do harm, and in placenta prævia.

FIG. 101.



In cases of neck and transverse presentation, Dr. Hicks recommends that "we should first of all endeavor to induce cephalic presentation; and then, should there be any difficulty in accomplishing it, to change our plans to podalic." The former of these two methods he thus describes: "Introduce the left hand into the vagina as in podalic version; place the right hand on the outside of the abdomen, in order to make out the position of the fœtus, and the direction of the head and feet. Should the shoulder, for instance, present, then push it with one or two fingers on the top in the direction of the feet. At the same time, pressure by the outer hand should be exerted on the cephalic end of the child. This will bring down the head close to the os; then let the head be received upon the tips of the inside fingers. The head will play like a ball between the two hands; it will be under their command, and can be placed in almost any part at will. Let the head then be placed over the os, taking care to rectify any tendency to face presentation."

CHAPTER V.

THE CÆSAREAN SECTION.

THE earliest record of this operation dates as far back as 508 years B.C., but it is only in comparatively later times that the results afforded by its performance have been in any degree satisfactory. A great deal has been written, especially of late, in regard to the propriety, and even the morality of this operation, some contending that it ought not, under any circumstances whatever, to be performed except as an absolute necessity, where there is no possibility of delivery *per vias naturales*. Those who take this view do not hesitate to imply disloyalty to moral laws on the part of those who, acting conscientiously, as we are bound to believe, and speaking from experience which would seem fairly to justify their advocacy, recommend the operation, not only in cases of absolute necessity, where there is no other means of escape, but also in cases where a dead fœtus only might be extracted per vaginam in the early months of pregnancy, on the plea that the living child in utero has some claims for consideration. It seems scarcely fair, and certainly cannot be called a scientific argument, to charge those who have had the good fortune to save about one-third of the mothers, and nearly all the children, with being enthusiastic practitioners, who silence conscience and are dazzled with the false brilliancy of the operation, especially when it is known that but for this proceeding every one of the children would have been ruthlessly sacrificed, and probably not more than, if as many as three-fourths of the mothers would be saved. No doubt, to a certain extent, writers on obstetrics will advocate that form of practice which they have personally found most successful. But while conceding the fairness and justice of such advocacy, and deprecating, at the same time, harsh imputations of moral disloyalty, I agree in the main with Dr. Barnes in the opinion that the Cæsarean section ought only to be resorted to in those cases where embryotomy is either impracticable, or cannot be carried out without injuring the mother. But here comes the difficulty, for who is to determine, or how can it be determined beforehand, that the attempt to deliver *per vias naturales* in cases of great pelvic distortion, will not inflict injury upon the mother, aye, and injury which shall be fatal? That the Cæsarean section must be resorted to where embryotomy is impracticable, is very clear, and admits of no dispute; but the case of the other is very far otherwise. Many have attempted to settle it by resolutely refusing to perform the Cæsarean section, where, possibly, two lives might have been saved, and resorting to a sacrificial delivery, where both lives have been lost.

Unfortunately we have no statistics by which to settle this question, for it is obviously unfair to compare the gross results of the Cæsarean section with the gross results of all the craniotomy cases which can be collected; very many of these latter cases are comparatively easy, and the mortality therefore to the mothers is, or ought to be, slight; but what we want is the maternal mortality of those cases of embryotomy which the advocates of the Cæsarean section would consider fit for that operation. I believe it to be enormously fatal, and to compare very unfavorably with the death-rate of the supposed more formidable procedure. If this be so, then, considering that all the children are sacrificed in the one while many are saved in the other, I think there can be no doubt that a strong claim is made out for a more frequent resort to the Cæsarean section, and that it is not sound advice which urges us to regard it as "the last refuge of stern necessity." On this point the late Dr. Radford gave it as his opinion, formed after deep and anxious study of the whole question, that "the Cæsarean section should be generally performed as an operation of election; and that craniotomy should be as far as possible abolished, and ought only to be performed as an operation of necessity, except in a very few cases."

To the student no doubt such conflicting opinions must be very puzzling, and to every right-minded man the having to decide such a point at all must ever be inexpressibly painful. Writing as I do now, as much or more for the student as for the practitioner who is called to act in such an emergency, I feel that I cannot do better than quote as a timely warning against a too hasty decision in either direction, the following very solemn and awful words of Dr. Bedford, in his translation of M. Chailly's work: "The Cæsarean section is undoubtedly a dread alternative for the accoucheur to choose; but I cannot agree with Dr. Chailly, that its fatality is so great as he represents; nor am I disposed to adopt the opinion (unfortunately too general) that craniotomy is always to be preferred to the Cæsarean section. In truth, it needs some nerve, and for a man of high moral feeling, much evidence as to the necessity of the operation, before he can bring himself to the perpetration of an act which requires, for his own peace of mind, the fullest justification. The man who would wantonly thrust an instrument of death into the brain of a living fœtus, would not scruple, under the mantle of night, to use the stiletto of the assassin; yet how often has the fœtus been recklessly torn from its mother's womb piecemeal, and its fragments held up to the contemplation of the astonished and ignorant spectators as a testimony undoubted of the operator's skill! Oh! could the grave speak, how eloquent, how momentous, how damning to the character of those who speculate in human life, would be its revelations!"

In regard to the mortality of this operation, Dr. Churchill informs us that of 450 cases collected from all sources, 230 mothers were saved and 220 lost; and that out of 315 children, 211 were saved, and 104 lost.

It thus appears evident that some, and by no means an unreasonable chance is afforded to both mother and child; and when it is further considered that the operation is seldom or never resorted to in this country except in cases where delivery by any other means, even to the extraction of the child piecemeal, is, if not absolutely impossible, at least so extremely difficult and dangerous that the mortality to both mother and child would be greatly above that afforded by this operation, the argument in favor of the proceeding gains additional force.

In this country the mortality is a good deal above that which obtains on the Continent, chiefly for the reason that we delay a much longer time before resorting to such a step, and thereby greatly lessen the chances of recovery. Moreover it is never performed here when there is a possibility of delivery by any means through the natural passages.

In considering the arguments in favor of the operation, one of the first to discuss is the chance of life for the child, seeing that it is chiefly on its account that the operation is undertaken. According to Dr. Radford, " the risk to infants in Cæsarean births is not much greater than that which is contingent on natural labors, provided correct principles of practice are adopted." And he adds in proof of this, "If I dare venture to give an ideal comparative estimate, I should say, if it is supposed that 1 per cent. be the mortality of natural labor, that consequent on the Cæsarean section may be stated as scarcely 1½ per cent." I am not aware, however, of any large number of cases from which such a favorable opinion as this can be deduced, and it appears to be very much a matter of conjecture, because, in a large number of the cases collected by Dr. Radford, the child is stated to have been dead before the operation was commenced. It is argued, therefore, that most of these children died during the labor, and that they would in all probability have been saved had the operation not been delayed so long. I question, however, whether there is sufficient evidence to warrant this conclusion.

As regards the chances of life to the mother we have to consider not only what are the risks and dangers consequent upon this operation, but what relation do they bear to those other risks which would be incurred if, in cases thought to be suitable for the Cæsarean section, preference were given for embryotomy. Now, according to the statistics it appears that in British and American practice rather more than two-thirds of the mothers die, and about one-half of the children. In foreign practice the mortality of the mothers is about 1 in 2½, and of the children about one-fourth. I give this on the authority of Churchill. If we compare this result with the practice of craniotomy we find that the mortality of the mothers in the latter is about 1 in 5½, while of course all the children are sacrificed. These facts, I think, fully justify a resort to the operation whenever pelvic deformity is such as to make the extraction even of a mutilated child a matter of serious difficulty and risk.

The cases in which the Cæsarean section is applicable are, 1. Pelvic distortion, from bony tumors or otherwise, where the diameter through which the child must pass falls below two inches. I fix this limit because it is certain that, by means hereafter to be described, a child may be extracted, without very serious risk to the mother, where the conjugate diameter measures two inches and upwards. I do not, therefore, consider that the Cæsarean section is absolutely necessary in a case with a conjugate diameter of two inches, unless at the same time the pelvis is in other directions, and especially at the outlet, a good deal distorted. If, however, the practitioner believes that he will not succeed in extracting the child *per vias naturales*, he had far better not make the attempt, for he would certainly have reason to reproach himself if, after having destroyed the child, he failed to deliver the mother, and was obliged after all to perform gastrotomy in order that she might not die with a mutilated fœtus in her uterus. 2. Cases of sudden death of the mother may under some circumstances require this operation. The points here to determine are that the child is living and viable—the latter is merely a question as to the duration of the pregnancy: if after seven months that is sufficient, and the stethoscope will soon determine whether or no it be alive. The length of time that it remains so after the death of the mother is a moot point, and is guided a good deal by the circumstances connected with the mother's death. If she died of asphyxia or hæmorrhage the child will probably be dead too; if of any long-standing disease the chances are somewhat, but not much, better for the child; if the mother died suddenly, as from an accident, for instance, then the chances are better still. Even in the latter case, probably five minutes after the mother's death is the longest time that can be trusted for extracting a live child, though in some exceptional cases ten minutes might suffice. 3. Certain cases of rupture of the uterus when the child is known to be alive. Here, again, it is very much a question of time, but probably a somewhat longer period may be allowed in such a case than in the case of maternal death. 4. Extra-uterine fœtation, the mother's life being threatened thereby. Both these latter groups of cases are not, properly speaking, cases of Cæsarean section, but cases of gastrotomy or abdominotomy, if I may coin such a word, for the uterus is not in either of these cases opened or cut at all. 5. Certain abnormal conditions, cancer, etc., of the vagina or uterus, where the mother's life must ere long succumb, and a chance is thus given to her offspring.

The causes of the mortality after the operation are, shock, hæmorrhage, subsequent inflammation, and exhaustion.

It is not easy to fix any rule as to *the period for performing the operation:* some advise that sufficient time be given for a certain amount of dilatation of the os, others recommend that it should be performed at the very commencement of labor, when the patient's strength is unimpaired and when she has greater power of resisting inflammation. Where it is quite clear that such a step is necessary, the weight of evidence leads to the conviction that the sooner the operation is performed after the commencement of labor the better. Certainly we ought not to wait until the patient's strength is taxed, nor until the maternal structures have been injured, bruised, or contused by the abortive attempts which have been made either by nature or art to effect delivery. Dr. Winckel recommends that the period adopted be about the end of the first stage of labor, and, if possible, before the membranes have ruptured, as the extraction of the child is effected more easily than when the liquor amnii has escaped, and no evil appears to result from its escape into the peritoneal cavity. On the other hand, Dr. Braxton Hicks advises that labor should be anticipated, on the ground that the wound of the uterus is more likely to heal when its tissue has not reached the degenerative stage. I do not, however, regard this as any impediment to the healing process; and, on the whole, I believe that there are advantages in waiting until nature has pointed out the time when she is equal to the performance of her part of the task; then it is the duty of the obstetrician to step in and aid her with the resources of his art. In the only case in which I have performed this operation, acting upon this principle, and being desirous to choose my own time for the performance of the operation I induced labor first of all, and so soon as uterine action was fairly established I proceeded to operate.

Mode of Performing the Operation.—The rectum and bladder having been previously emptied, the latter especially, as the incision must be carried pretty near the symphysis pubis, the patient should be placed upon her back, with the head and shoulders a little raised, the pelvis also somewhat elevated, and the thighs fastened to the table by a broad bandage so as to keep the patient absolutely fixed. Care should be taken that the temperature of the room is maintained at not less than from 70° to 80° F., and the operator should be provided with two or three stout-hearted and intelligent assistants. Knives, scissors, forceps, needles, ligatures of silk and wire, and galvanic battery, ice, perchloride of iron, carbolized oil, lint, oiled silk, adhesive plaster, a many-tailed bandage, or one of my obstetric belts as made by Salmon, cotton-wool, and a number of large and small sponges, new and clean, on holders and without, should all be provided beforehand, and nothing should be wanting when the operation is begun. A probang should also be prepared for passing through the os uteri after the uterus is emptied.

With regard to the question of anæsthesia, there can be no doubt of its extreme value in these cases; but considering the importance of rest after the operation, and the danger which there is of inhalation inducing vomiting, considering too that after the first or cutaneous incision the pain of the operation is not necessarily very acute, I am strongly in favor of the practice which I have seen carried out most successfully on two occasions by Dr. Richardson, in cases operated upon by Dr. Greenhalgh, viz., local anæsthesia by the ether spray.

The patient being thus prepared, an incision should first be made, about six or eight inches long (I am decidedly in favor of a free incision) extending from the umbilicus to within a short distance of the pubis, along the linea alba; the skin, fascia, and peritoneum are then to be divided. The advantage of choosing the linea alba is that no muscles are divided,—there is, therefore, less hæmorrhage; and the uterus is sure to be immediately under the incision, uncovered by intestine. Richter points out, also, that when the uterus is empty and contracted, the incision into it and the external incision correspond, so that discharges may escape from the former through the latter. It is preferable, however, to close up the external wound, so that any discharge should go by the natural passages; the only disadvantage of this central incision is the chance of coming upon the placenta in cutting into the uterus. Dr. Pfeiffer has suggested a mode by which we may probably discover beforehand the situation of the placenta, even if we cannot avoid it. He recommends that before making the incision into the uterus, we should place the hand flat upon the uterus, when a peculiar vibratory thrill will be felt over the situation of the placenta; we may also find, he says, that, owing to the greater number and size of the vessels in this locality, the part bulges somewhat. If these points are made out it will be well to cut wide of the suspected part. I am bound to say, however, that neither of these points could be clearly made out in my case already mentioned.

There is another point which requires attention. I have seen one case and heard of another in which the incision into the uterus was made so boldly and dexterously that the knife went not only through the uterus and membranes, but also through the skin and into the muscles of the back of the child! Such a mistake is easily avoided, and without any loss to the brilliancy of the operation. The peritoneum should be divided downwards upon a director and upwards between the two forefingers of the left hand, so as to avoid injuring the intestines. As soon as this is cut through, the uterus will be seen, and an incision should be made into it of about four or five inches in length, and limited entirely to the body of the organ; neither the fundus nor the cervix should be incised, as either appears to interfere with the proper contraction and closure of the wound, and so to favor hæmorrhage. In making the incision in the uterus there is no great necessity for haste on the score of bleeding, for I have been struck at the little blood that flowed; as the knife is drawn along, layer after layer of the uterine fibres are cut through, the wound gapes open by the retraction and contraction of the fibres, and this seems to close the sinuses and vessels, so that really very little blood is lost.

Another point of practical value at this stage of the proceedings has been suggested by Dr. Winckel, who has had very considerable experience in this operation; it is this, that when the incision into the uterus is made, an assistant should hook up, as it were, each end of the incision with two fingers—one at either end—and hold them up as close to the outer wound as possible: this not only keeps the other viscera out of the way, but it also, to a great extent, prevents the blood and other discharges from finding their way into the peritoneal cavity. If, notwithstanding the precautions already described are taken, the placenta is met with, it should at once be thrust aside, the membranes should then be rapidly opened, and the child extracted; occasionally there is some difficulty in this stage of the proceedings, and it will be best avoided if in seizing the child we are careful to take hold of it so that either the head or the breech is taken out first.

As soon as the child is extracted the placenta and membranes are to be removed; and now begins perhaps the most dangerous part of the operation, owing to the bleeding which sometimes takes place from the placental site when the uterus fails to contract. In such a case, if grasping the uterus does not insure contraction, the insertion of a lump of ice in its interior, or its application outside to the fundus, will generally suffice. But better still, if galvanism is at once resorted to, we shall generally by these means succeed in securing firm contraction. Prior to this, however, care should be taken to remove all coagula, from the interior of the uterus, and to see that the os is free for the passage of the lochia; for this purpose a probang should be passed through the os from the interior of the uterus and out by the vagina. We should also be especially careful to remove all coagula from the peritoneal cavity and wound, before bringing the edges of the latter together.

Owing to the contraction of the uterus, the wound in it diminishes very quickly, and if the parts be healthy it speedily unites. One very important question now arises, viz., as to the necessity for applying sutures to the wound in the uterus. Some authorities have recommended them on the ground that in some fatal cases the edges of the wound have been found gaping post-mortem; but while I admit that there is no evidence to prove that the gaping did not occur after death, in consequence of there being no reparative process during life, and in such a case, therefore, it is certain that no suture would have induced union if the healing power were wanting; yet, on the other hand, I must confess that, contrary to what I advocated in former editions of this work, I am of opinion that it is safer and better to secure closure of the wound by sutures rather than trust to the uncertainty of uterine contraction. As a rule, therefore, I should certainly not object to this foreign element being introduced, and I would rather trust to it than to uterine contraction for securing apposition of the cut surface. If, then, sutures are used, we may either follow the practice of Mr. Spencer Wells, who, in one case which recovered, introduced an interrupted silk suture which he brought out through the uterus and vagina; or we may use silver-wire sutures, cutting them off close and leaving them to take their chance in the abdominal cavity. I confess I greatly prefer the latter mode, and would certainly adopt it in any future case that may come under my care. In the only case I have yet had I used catgut ligatures, and to that catgut I ascribe the fatal result that occurred, for the patient was going on perfectly well up to the third day, when she suddenly went into a state of collapse and died; and on making a post-mortem examination it was found that every one of the catgut ligatures had given way, the uterus was gaping open, and the sutures lay across the wound as if they had never been tied. Precisely the same thing happened more recently in a case which was operated upon by Dr. Routh. Silver wire would certainly be proof against this accident.

Having secured the uterine wound, the external wound should be brought together by means of silver sutures placed pretty closely together; and, according to my experience in cases of ovariotomy, these sutures should be passed through the peritoneum, so that on the inside of the wound we may have two peritoneal surfaces opposed to each other; union is then very speedily effected—even twenty-four hours is sufficient to secure this—and the ingress of any discharges from the wound into the peritoneal cavity is prevented.

It is of great importance during the operation to keep hot flannels over the abdomen, and to guard by them the extrusion of the intestines; not so much for the purpose of excluding contact of air, for that seems really to be of little moment, as to keep them warm and moist. The air must and does reach them the moment the peritoneal cavity is opened, and it remains in contact with them throughout the operation.

A piece of lint wet with carbolized oil should be applied over the wound, and then several broad bands of adhesive plaster should be placed across the abdomen as a means of support, and to keep the wound quiet; over this some cotton-wool should be laid, which may be secured by one or two pieces of strapping, and a warm flannel bandage about a foot wide should be carefully rolled several times round the abdomen, from the hips up to the ribs, so as to secure warmth and uniform support; or, better still, one of my obstetric binders may be applied.

Some advise that an opening be left in the wound to allow the passage of the discharges from the cavity of the uterus or peritoneum; this, however, appears to me very undesirable, for it is far better that the peritoneum should become united as soon as possible, and that the wound should be treated as a simple incised one, without the complication of an opening into the abdomen, which must have the effect of increasing the danger. The only argument which can be urged in favor of this proceeding is that of Dr. Marion Sims, viz., that fatal cases often result from septicæmia and the presence of putrescent matter in the peritoneal cavity, and that, therefore, we ought to be able to wash this out; but the results of this practice in his hands has been such that I believe he has now definitely abandoned it.

After the operation the patient should be kept perfectly quiet, and, for a few hours, at least, as little as possible should be put into the stomach. If the shock be very great, and there be little rally, brandy may be freely given. This is readily absorbed without the trouble of a digestive process; it increases nervous and vital power, and so gives greater resistance to morbid agencies, while it strengthens the patient against any adverse consequences. Opiates are sometimes of service if there be much pain or restlessness, but experience seems to prove that cases are far better left without any drugs, unless there be some clear indication for their use. Certainly opiates should not be given as a mere matter of routine, but where they are necessary either a suppository of the compound soap pill, ten grains, or the subcutaneous injection of an eighth, a sixth, or a quarter of a grain of morphia, will be found the best mode of administration, as they are less likely to cause vomiting than any other preparation. Ice and creosote are of use in controlling the vomiting, as is also the administration of one-minim doses of ipecacuanha wine in a teaspoonful of water every hour. My own rule, after all abdominal operations, is for the first twenty-four hours to put nothing into the stomach but ice, or iced water, with perhaps an occasional teaspoonful of brandy, and sometimes a little strong coffee; then, for three or four days, strong liquid food in small quantities every two or three hours. If after the first twenty-four or forty-eight hours great abdominal pain is complained of, I remove the dressing and apply an opiate linseed-meal poultice. Having used carbolized oil at first, there is no necessity to disturb the wound for any purpose until the stitches are removed, which I usually do on the sixth or seventh day. I think it is of great importance to keep the parts quite quiet for the first four days, and this mode of dressing enables this to be done.

CHAPTER VI.

THE SIGAULTEAN OPERATION.

THIS operation, which takes its name from M. Sigault, who first introduced it, was intended by its author to supplant the Cæsarean section. The idea of the operation arose from the belief which he held, that in difficult labor the bones of the pelvis separate from one another; hence the suggestion that, in cases where so much deformity exists as to preclude the possibility of a child being born alive, the symphysis pubis should be divided so as to separate those bones, and thus increase the diameter of the pelvis sufficiently to allow of the passage of a living child by the natural way.

Symphyseotomy, as this operation is called, has never met with any favor in this country, and it might appear to be altogether unnecessary to make any allusion to it, seeing that, so far as I know, no authority either in this country or abroad now ventures to recommend or to practice it. Under these circumstances, it would seem like "slaying the slain" were I to attempt any argument against it; at the same time, it may be well to put on record some few facts regarding this procedure, if only as a warning against the publication of such crude suggestions, which are destined only to a sort of butterfly existence, but without even so much to recommend them.

According to Dr. Churchill, 49 cases have been recorded, of which 16 ended fatally to the mother, the rest survived; 11 children were born alive, 19 dead: that is, rather more mothers, but less children are saved than by the Cæsarean section. These figures, however, do not tell what was the condition of the mothers after recovery; but Dr. Churchill informs us that "although 33 mothers recovered, yet, to save 14 children, they paid very dearly: for 1 had the bladder and urethra injured; 2 had incontinence of urine; 3 had prolapsus uteri. In one the bones of the pelvis exfoliated, the cervix uteri and posterior part of bladder were gangrenous." And further, he adds that, although 33 mothers recovered, 10 children were lost, 14 were saved, and 1 was a good deal injured; of 7 nothing is stated. Of the 16 mothers who were lost, 5 of the children only were saved, 9 were dead, 1 was much injured, and of 1 nothing is stated; so that in the latter case 16 mothers were sacrificed to save 5 children.

From experiments on animals performed by Dr. William Hunter, it was found that by simple division of the symphysis pubis very little space indeed was gained. In fact, in order to increase the conjugate diameter one inch the pubes must be separated three inches, while a separation of two inches gave only half an inch increase in the conjugate, and was invariably attended with rupture of the great sacro-sciatic ligaments and frequent injury to the bladder and its ligaments.

Hence the gain in cases of severe distortion must be insufficient for the purpose of extracting a living child; and, in cases of less severity, craniotomy is preferable from the far less maternal mortality. It cannot, therefore, be regarded as a substitute for the Cæsarean section, inasmuch as it fails in those cases which are suitable for the latter proceeding; and accordingly in this country the operation has never been thought of.

The advantages which were claimed for the operation by its advocates were, First. That the chance of saving the child is greater in this than in the Cæsarean section; but this is controverted by the facts that in the former the deaths were as 19 to 11, while in the latter this proportion is more than reversed. Secondly. The danger to the mother was said to be less in this than in the Cæsarean operation; here again, though it is so far true that the actual maternal mortality is somewhat less, yet the evils entailed upon the mothers are often worse than death itself.

On the other hand, as against the operation, we have to place not only the greatly increased mortality among the children, and the terrible suffering which it often entails on those of the mothers who are saved by it, but we must also add that in no case in which the choice lay between this and the Cæsarean section could the operation be successful, because the utmost that could be gained by the separation of the pubic bones would only suffice to admit the passage of a mutilated child, where before not even that could be accomplished; so that, in this case, the mother would be subjected to an operation little less dangerous than the Cæsarean section, while no chance whatever could be given to the child, who would thus be sacrificed, and so the total mortality would be very considerably increased.

The *mode of performing the operation* is thus described by Dr. Osborn, who, however, gives it as his opinion that "no circumstances whatever, real or imaginary, can ever render it a warrantable operation." He says, speaking apparently as an eye-witness, "Mons. Sigault, with a common bistoury, cut through the integuments and linea alba, beginning the operation at the upper and central part of the symphysis pubis; then, introducing his forefinger as a director, he cut through the ligaments and cartilage; immediately on the completion of which, the two ossa pubis, with a peculiar noise, spontaneously separated two inches and a half: this was demonstrable, for M. Le Roi laid his four fingers into the opening. M. Sigault immediately introduced his hand into the uterus, broke the membranes, and brought down the feet. M. Le Roi accomplished the delivery; the whole operation, both section and delivery, was finished in five minutes. The child was born alive. A ligature was passed round the body of the mother to keep the pelvis. firm. The patient, having .no bad symptoms, was left till the next day, when every circumstance continued favorable. She had passed her urine voluntarily twice; there had been no hæmorrhage, and she had suffered little pain."

CHAPTER VII.

CRANIOTOMY.

Having considered the operations which are intended to effect the delivery of a living child, it now remains to discuss those which aim at accomplishing delivery by the sacrifice of the child; these are craniotomy, embryulcia, decapitation, and cephalotripsy.

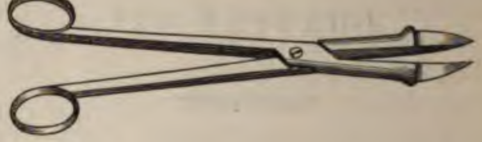
Perforation of the fœtal head was one of the very early operations in midwifery; it was practiced by Hippocrates, and though but little change has taken place in the mode of performing the operation since his time, an almost infinite variety of instruments have been invented for the purpose. Only those, however, which are most commonly employed will be mentioned here. The chief variations in the instruments now in use refer either to the perforator itself, or to the forceps which are used for extracting the child.

Dr. Churchill finds that with regard to the statistics of the operation, taking the average practice of this country, in 173,625 cases of labor, perforation was resorted to 563 times, or about 1 in 308½. In France and Italy the frequency is about 1 in 563¾, and in Germany 1 in 1675. The conjoint tables give a total of 859,178 cases of labor, with 1018 cases of craniotomy, or 1 in 844. From the only table where the result to the mother is stated, it appears that of 800 cases, 141 ended fatally, or about 1 in 5½; but in private practice the result is very different, for of 161 cases only 7 died, or 1 in 23.

It has been my misfortune to have to use the perforator 34 times; 33 times it was applied to the head, and 4 times to the chest and abdomen. Of these, 31 mothers recovered, 3 died. Of the latter, I believe if the Cæsarean section had been performed, a better result might have been obtained; but the friends would not consent to this, and rather than see the mothers die undelivered, I used the perforator and extracted; but fatal peritonitis ensued, and the patients sank exhausted.

The perforators mostly employed are either Smellie's or D
man's scissors, Fig. 102, which consists of a pair of large str

FIG. 102.



scissors, about twelve inches long, sharp at the points and on th
outer edges, each blade having a stout shoulder about one i

FIG. 103.

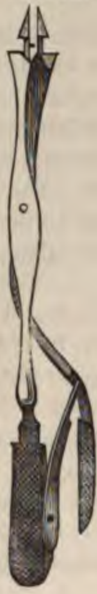


FIG. 104.

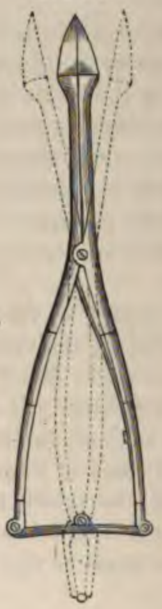
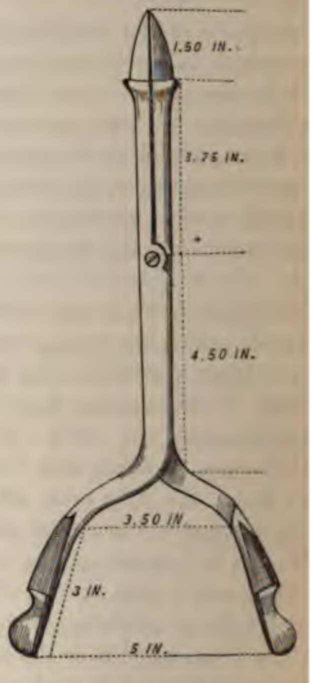


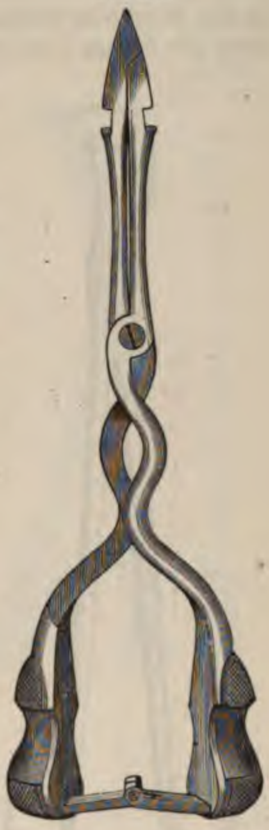
FIG. 105.



and a half from the point, which limits its entrance into the c
nium. The other instruments are similar at the perforati
extremity, but instead of opening like a pair of scissors, they op
by compressing the handles, and thus enable the operator to ha
one hand free for guarding the soft parts from injury. A v

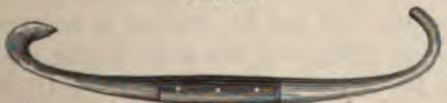
good form of perforator of this kind is that which is represented in the annexed sketch (Fig. 103); it is the one which I am accustomed to use, and it answers very well. I think it is an advantage that this perforator is straight with the wooden handle, as it enables the operator to guide the instrument better, and so to make the opening into the cranium with as little difficulty as possible. Fig. 104 represents the perforator of Sir James Simpson, and is a very convenient, portable, and efficient instrument. The perforator of Dr. Oldham (Fig. 105) is larger and more powerful, but I do not know that these are advantages. The action of this instrument is much the same as the one I use, but there is no spring attached to the handles, and it is, I think, a disadvantage that neither of the handles are parallel with the point of the instrument, so that, in perforating, this instrument has to be held firmly between the handles, which is certainly not so convenient as in the other form, or in the one of Sir James Simpson. It seems rather to sacrifice handiness and convenience to unnecessary power. Dr. Greenhalgh's perforator is very similar in action to that of Simpson's, but is much larger and more powerful, perhaps unnecessarily so. It is represented in Fig. 106.

FIG. 106.



The instruments which are used for extraction are the craniotomy forceps, the crotchet, represented in Fig. 107, which also contains at one end a blunt hook, which is used occasionally for

FIG. 107.



extraction in cases of breech-presentation, and the small vertebral hook of Dr. Oldham. The former consists of very strong forceps, of which there are many varieties. First, we have the scissor-form of forceps, of which Dr. Godson's instrument, represented in the annexed drawing, Fig. 108, is the best. Fig. 109 represents the forceps I am in the habit of using. It has stout teeth

FIG. 108.

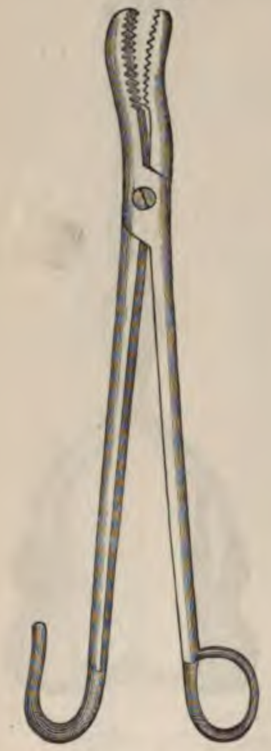
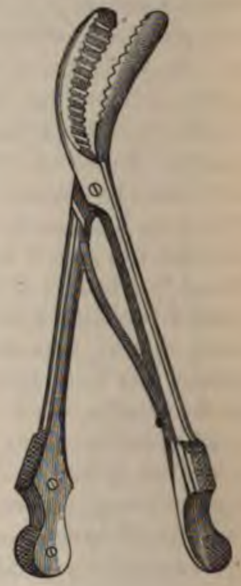


FIG. 109.



on the inner surface of the blades; one blade is introduced into the interior of the skull, the other, of course, is outside, and by these means a firm hold may be obtained on some portion of the cranium. Other varieties of this same forceps are seen in Fig. 110, which is Dr. Barnes's; Fig. 111, which is Dr. Davis's; and Fig. 112, that of Dr. Murphy's, in which one blade is fenestrated.

The crotchet is a blunt hook, with which Smellie used to catch hold of some portion of the skull on its outer side; but not only did this proceeding often occasion considerable pain to the mother, but from the difficulty of taking a firm hold, and the consequent liability to slip, injury was often inflicted on the soft parts either of the mother, or of the hand of the operator, courageously and wisely introduced for the purpose of shielding the patient. Subsequently the crotchet, with or without some slight modification, was passed *inside* the cranial cavity, and thus to some extent the dangers of laceration were avoided. On the whole, however, the forceps seems to be generally preferred, and is certainly, according to my experience, the safer and more convenient instrument of the two. Lastly Dr. Oldham has invented a small vertebral hook, about twelve inches in length, straight, and having at its extremity a little hook, which is bent at an acute angle with the stem; this instrument is shown in the annexed sketch (Fig. 113). When used it is to be introduced through the aperture in the skull into the vertebral canal, and having obtained a purchase there very considerable extracting power is attainable.

FIG. 110.

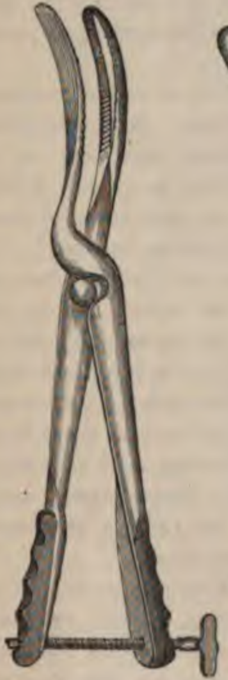


FIG. 111.

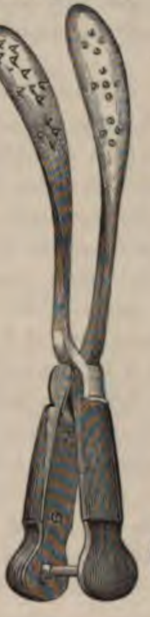


FIG. 112.

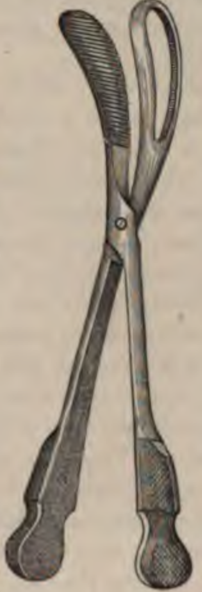
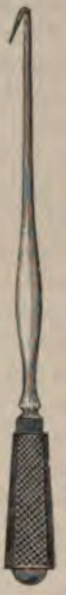


FIG. 113.



In deciding upon the performance of this operation the object is so to lessen the size of the head that we may be able to bring it down without danger to the mother, in cases where, owing to great disproportion between the head and the pelvis, delivery of a living child, *per vias naturales*, cannot be accomplished. At one time it was the rule to wait until the child was dead; but this is fortunately not the case now, as by this practice the danger to the mother was greatly increased, while nothing is saved to the child.

Authorities differ widely in their opinions as to the *conditions which should justify a resort to this proceeding.* Some affirm that through a diameter of an inch a mutilated child may be extracted; while others think that unless there be a space of fully two inches, the danger to the mother is so great that "it would be far better to have recourse to the Cæsarean section." The majority seem in favor of the latter view, and judging from the results obtained, this rule seems by far the safer. For my own part I would certainly hesitate, even if I did not actually decline, to perform craniotomy with a diameter of two inches, and I would assuredly not do it if, after full consultation with the patient and her husband, they were willing and desirous to share the risk and danger of the Cæsarean alternative, believing as I do that in cases of such distortion the danger to the mother nearly equals that of the Cæsarean, while the life of the child is necessarily lost in the one, most probably saved in the other.

Cases requiring the Perforator are, 1. Where the pelvis or soft parts are deformed, by tumors or otherwise, to such an extent that either the conjugate diameter at the brim or the transverse at the outlet, measures less than three, but not less than two inches. The normal dimensions of the pelvis may be thus reduced either by simple pelvic deformity, the result of rickets or of mollities ossium; or by tumors connected either with the pelvis—bony or enchondromatous, or with the pelvic organs, such as ovarian or fibroid tumors of the uterus. Cancer also of the uterus is thought by some to justify craniotomy, but considering that this disease must before long prove fatal to the mother, I could not under these circumstances sanction the sacrifice of the child, at least not if the cancerous disease had advanced far, and invaded the whole cervix: the Cæsarean section in such a case seems to me the obvious method of treatment. I have on two occasions seen the child pulled piecemeal through a cancerous uterus and vagina, with so much injury to the mothers that they died, the one in a few hours, the other in a few days. Such practice is, in my judgment, wholly unjustifiable, and is a scandal to our art.

2. Cases where, without any abnormality of the pelvis, there is such a disproportion between it and the child, that extraction by the natural passages of a living child is impossible. Hydrocephalus is a case in point: here the head is perhaps too large to enter the pelvis, and cannot be compressed by the forceps to the required limits.

3. Certain cases of malpresentation, as, for instance, of the arm, together with the head, where the former projects into and even beyond the vagina and cannot be returned, both head and arm being firmly wedged in the pelvis, the liquor amnii being all gone, and the uterus firmly contracted upon the child. In like manner some cases of face presentation may require to be thus treated.

4. Where the labor is very tedious, and the child dead. Here there is no object in waiting, for the child is beyond recall, and the mother is certain to be injured more or less by the continuance of uterine action when no progress is made. We might in such a case terminate it either by forceps or turning, but the perforator will accomplish the object much more speedily, and with far less risk and suffering to the mother. Of course, in such a case there must be absolute proof that the child is really dead.

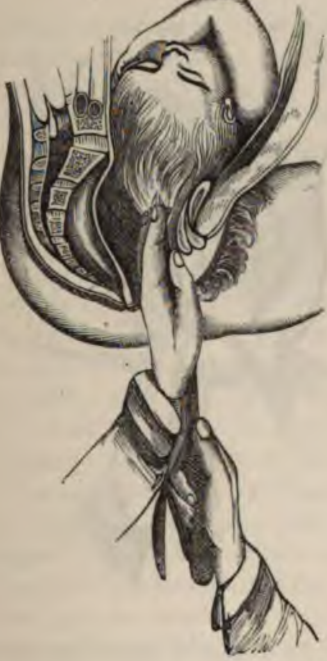
5. Cases requiring speedy delivery, when the forceps is inapplicable, such as certain cases of convulsions, rupture of the uterus, some forms of dangerous hæmorrhage, exhaustion, etc.

No fixed rule can be given as to the *period when the operation should be performed.* Where there is any reasonable doubt as to its necessity, of course every opportunity should be allowed for the natural powers, aided sometimes by the forceps, to accomplish delivery; but in cases where its necessity is evident from the first, the sooner it is performed after the dilatation of the os uteri the better, and if there be any sign of exhaustion we need not wait even for this; delay can only be injurious to the mother, and it is probably from waiting too long that the maternal mortality in this country is so high after craniotomy. The rule which required delay till the child was dead is now happily obsolete, in this country at least, and it is hoped will never be revived. Such a practice is literally "waiting upon death," and, as Dr. Barnes truly says, "it seems a refinement of casuistry to distinguish between directly destroying a child, and leaving it exposed to circumstances which must inevitably destroy it." As soon, therefore, as it is clear that a live child cannot come by the natural way by any known process of obstetrics, and if, moreover, there be good grounds for believing that the maternal risk is not too great, we ought to decide upon the operation.

As regards the state of the os uteri, there ought, at least, to be sufficient dilatation to admit of the easy application of the perforator, if that be the instrument we intend to use, and certainly not less than this will suffice if the cephalotribe be employed.

Mode of performing the Operation.—The patient should be placed in the usual obstetric position upon her left side, with the legs well flexed on the abdomen; and the bladder and rectum should be emptied. Two fingers of the left hand are then to be introduced up to the head, and should serve as a guide to the perforator, which is to be passed very carefully along the palmar surface of the hand, and guarded by the examining fingers up to the head. It need hardly be said that as the perforator is a cutting instrument the utmost care should be taken to avoid injury to the maternal soft parts, and the point of the instrument should not be made use of until it is carefully placed against that part of the head which we intend to perforate. Fig. 114 represents the perforator so applied to the head, the fingers of the left hand being introduced into the vagina with a view to carefully guard the instrument against inflicting any injury upon the maternal structures. As a general rule the opening is made into the most depending portion (provided that be *not* a suture or fontanelle, which would close over after perforation). Care should also be taken to place the point of the instrument exactly perpendicular to the bone, and it is for this reason that I prefer the slight curve which exists in my instrument, as it adapts itself better to the curve of a deformed pelvis, and there is, I think, less danger of the instrument slipping and injuring the maternal structures, which it is apt to do if the point be not exactly perpendicular to the head. The instrument is to be pushed by a gentle semi-rotating movement through the bone of the cranium up to the shoulder or cutting-notch which exists at about an inch from the end of the perforator. During this part of the operation an assistant should steady the uterus externally, as otherwise, a especially if the head be very firmly ossified, the perforator will push the head away without penetrating it. The blades are now to be opened to their full extent, and thus an opening is made into the skull. This process is then to be repeated in the opposite direction, so as to make a crucial incision. The brain should then be broken up by thrusting the perforator, or, better still, the vertebral hook, into the interior as far as the medulla oblongata; in doing this we at once destroy all suffering in the child, and at the same time facilitate the exit of the cerebral mass from the skull. For decency sake, the contents of the skull should be caught in a small basin as they are expelled from the vagina.

FIG. 114.



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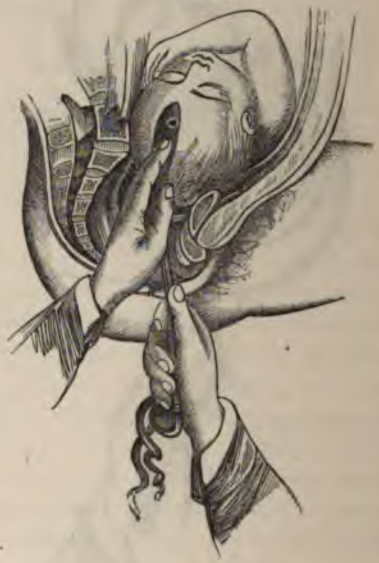
After perforation we should wait a short time to see whether uterine action may not suffice to expel the child; should it not, then either the crotchet, the craniotomy forceps, the cephalotribe, or the vertebral hook may be employed to complete delivery. In the use of any of these instruments the greatest care should be taken to guard with the two fingers of the left hand in the vagina, the maternal tissues from laceration, either by the instrument employed or by the sharp projecting fragments of bone.

The subjoined illustration (Fig. 115) represents the application of the craniotomy forceps: here again the fingers of the left hand are introduced into the vagina to protect the soft parts from injury, one blade of the forceps is within the cranium, the other is seen outside, the hold being taken upon the frontal bone chiefly. The handles are represented tied together, but this arrangement is entirely optional.

FIG. 115.



In all cases in which assistance in the way of extraction is required, the cephalotribe will be found of great service, and the more so the more the pelvis is deformed; always provided that it be not so deformed as to make the case unsuited for any operation which aims at delivery *per vias naturales.* If the deformity be such that extraction even with the caphalotribe is extremely difficult, then undoubtedly it would be far better to resort to the Cæsarean section, in the hope of saving both mother and child.

In making traction we should aid the expulsive efforts of the uterus, and we should also be careful to pull in the direction of the axis of the part in which the head is situate. If necessary, the skull may be still further broken up, but when there is any very great difficulty in extraction it will often be of great service to wait a few hours, until sufficient time has elapsed for that softening to take place which is one of the early results of putrefaction.

With regard to the position in which it is easiest to procure the descent of the head after perforation, Dr. Braxton Hicks has written a most admirable paper in which he proves very conclusively that "after the calvarium has been removed, the easiest position for the head to descend is by the face presenting downwards, the chin pointing forwards." So that in cases of difficulty, where the craniotomy forceps is required, this point should be borne in mind. In the more ordinary cases traction may be made upon the head in its original direction.

The experiments upon which Dr. Hicks founded the practice above referred to, brought out the following conclusions, that, "after perforation, and up to the evacuation of about one-quarter of the brain, the occipito-frontal diameter is smaller than the mento-bregmatic; but after this point the mento-bregmatic diminishes in direct proportion as we evacuate the brain, reduce the rigidity of the calvarium, or remove it altogether." Hence he sums up with the following rule,—that although, as has been always acknowledged, the vertex-presentation in natural labor is the best, and that after perforation and the evacuation of the brain up to the extent of one-fourth, this rule holds good; yet if the evacuation of the brain and collapse of the calvarium by this means, or by more or less fracturing the bones, be carried to a greater degree, that is, in cases where the conjugate diameter is less than the bizygomatic, we find that the facial mode of presentation affords the easiest mode of delivery; and further, that if we remove the whole calvarium, leaving merely the base, and then induce face-presentation, taking care that the chin as it descends points anteriorly, we diminish to the smallest possible amount the opposition of the head, leaving only, he says, from one to one and a half inches in depth to oppose the conjugate diameter of the pelvis, and three to three and a half, at the most four, inches to the transverse or its representative. Dr. Hicks uses for this purpose a blunt hook, having a malleable stem for facility of application, which he applies to the orbit, and makes traction downwards, and a good deal forwards, taking successive hold of the orbit, mouth, and chin if necessary. It does not appear, however, that the ordinary craniotomy forceps will fail in this purpose, and I think it is on the whole a safer and more manageable instrument.

Another mode of effecting delivery, after perforation, consists in the operation of turning, for it is found that when the contents of the skull have escaped, firm traction upon the base of the cranium will cause greater compression, and enable the head to pass through an opening which it would not do if the vertex were brought down first; in fact, the base of the skull is, as it were, the thin end of the wedge of which the vertex is the base, and the same mechanical law holds good here as elsewhere. Besides all this, a much firmer and better hold can be taken of the trunk and lower extremities of the child for the purpose of effecting extraction than can be secured in any other way. Supposing that the pelvic distortion be such as to occasion great difficulty in the extraction of the head after perforation and turning, then we should bear in mind that in accordance with the principles experimentally demonstrated by Dr. Braxton Hicks, the occiput should be drawn down first in preference to the face.

If, however, the delivery be accomplished with the head downwards, the body will speedily follow the passage of the head, unless there be either great pelvic distortion or some other obstacle. Sometimes, but very rarely, the child is prevented from passing the pelvic brim even after the evacuation of the cranium; in this case the perforator must again be applied to eviscerate the contents either of the chest or of the abdomen. This last proceeding is termed

EMBRYULCIA.

This operation is required sometimes in cases of arm-presentation, where the membranes have ruptured, the liquor amnii escaped, and where the uterus is so firmly contracted on the child, which is thus jammed down into the pelvis, that turning has become impossible. Here, taking hold of the protruded arm, in order to steady and fix the body of the child, the perforator must be applied to the chest in an intercostal space; and, if necessary,

e of the ribs must be cut through, in order to facilitate col-
e of the thoracic walls. The subjoined illustration (Fig. 116)
esents the performance of embryulcia just at the time when
perforator is being applied to the walls of the chest; here the

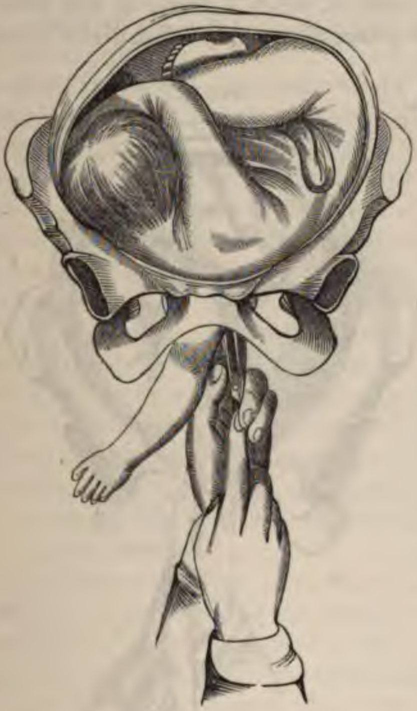


FIG. 116.

ors are being employed to cut through one of the ribs, that
g sometimes the only way by which the contents of the chest
be evacuated.

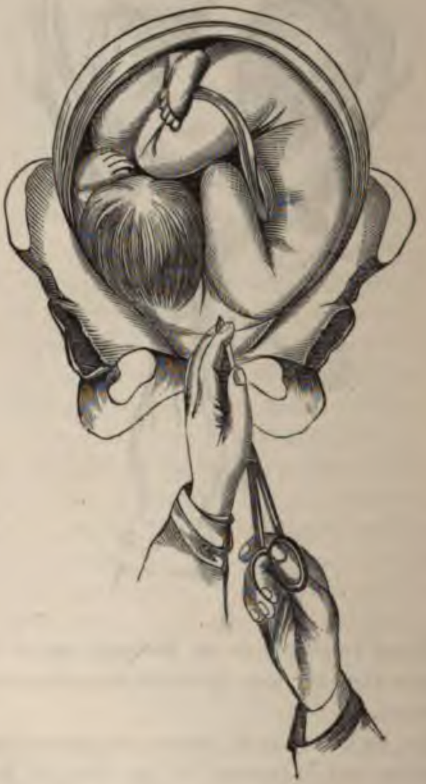
ccasionally, as I have said, in cases of great pelvic distortion,
perforation and extraction of the head, it is necessary to
up the chest or even the abdomen, though the latter is
m or never required, except in cases of ascites, or other dis-
l or malformed conditions. I have, however, had to perform
operation three times; in one case, the head, chest, and ab-
en were successively opened for dropsical accumulations. In

some cases of arm-presentation such as I have described, where the neck is jammed down in the pelvis with the arm, it is necessary to perform

DECAPITATION.

This operation I have usually performed with a pair of strong sharp-pointed scissors, which I prefer to any other instrument; with this I first pierce the neck, and then divide the spinal column.

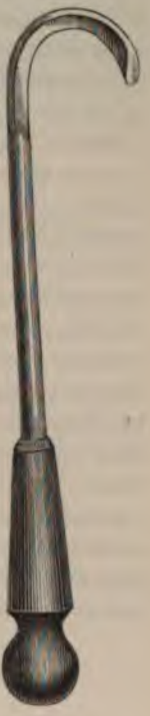
FIG. 117.



The trunk of the child may then be drawn down, leaving the head in the uterus, which may afterwards be extracted by forceps or by other means.

Fig. 117 represents the position of the child which might rende the performance of this operation necessary, and, though somewhat diagrammatic, the left hand is represented as if in the vagina to protect the maternal structures from injury. The point of the scissors is represented as just perforating the skin at the back of the neck, with a view to the division of the spinal column and spinal cord, as the first step in the process of decapitation.

Fig. 118.



Dr. Ramsbotham invented another instrument for performing decapitation (Fig. 118); it consists of a strong hook, having the inner edge of its curved part sharp for cutting through the neck; this is fixed into a handle with a straight stem some eight or ten inches long. This hook is to be guided by the finger up to the neck of the child, round which it is to be turned; then, by firmly pulling downwards, and at the same time making a side-to-side movement, the neck is cut through, the hook itself being carefully guarded by the fingers of the left hand against inflicting any injury on the maternal structures. As soon as the head is cut off, the body of the child is to be drawn down, and the head subsequently extracted by forceps or otherwise.

I may say of this instrument that I have used it on three occasions when I have been called upon to perform this to me most horrible of all obstetric operations; in each case I was unsuccessful, and was obliged ultimately to use the scissors mentioned above. The amount of force required was such that I felt afraid lest when the vertebral column was cut through the instrument would give a sudden dash and either injure my own hand or the parts of the mother. The scissors are certainly much more expeditious, and in my judgment easier of application; they are also less likely to do harm.

It need hardly be said that for so horrible an operation the case should be one of the utmost urgency; fortunately, the child is generally dead when such a proceeding is necessary.

Dangers of the Operation.—Now, under ordinary circumstances, it can hardly be said that any of the operations above detailed are difficult; at the same time, there are no doubt cases in which the difficulty of effecting delivery is extreme, and of course, speaking generally, the difficulty is in direct proportion to the amount of pelvic distortion. As regards the child, we may almost say there is no danger, for the simple reason that its destruction is the essence of the operation. The danger, therefore, has reference only to the mother, and perhaps the greatest of all, because so common, is the injury which results from too long delay, in the shape of inflammation, sloughing, etc., of the maternal structures, giving rise to vesico-vaginal fistula, to cicatrices about the cervix uteri and vagina, to metro-peritonitis, cellulitis, and the train of evils resulting therefrom; possibly even to shock, exhaustion, and death. Next to this, injury may be inflicted by the perforator slipping over the child's head and penetrating some of the soft parts of the mother, the vagina or uterus; or damage may be done by the crotchet or craniotomy forceps slipping and bruising or tearing the soft parts. In one instance I have known the soft parts torn by being included within the grasp of the forceps. Lacerations have also been produced by projecting spiculæ of the cranial bones. It is obvious that all these injuries are avoidable with ordinary care and judgment, and that most of them can only occur as the result either of gross ignorance or of equally culpable neglect. But in this, as in so many other cases, ignorance is far more responsible for injury than neglect.

CHAPTER VIII.

CEPHALOTRIPSY.

WITHIN the last few years the operation of cephalotripsy has been much more largely practiced in this country than formerly, owing probably in great measure to the increased attention which has been paid to the improving and perfecting of the instrument with which it is performed. And, considering that the operation is not on the whole a very difficult one; that, moreover, it is applicable to cases which would perhaps hardly admit of the performance of craniotomy, it is not to be wondered at if cephalotripsy should become of still more general use in cases where this dread resort of the obstetrician is necessary. That we can deliver by means of the cephalotribe more easily and more safely than can be done by any other method, in cases of great pelvic deformity, admits, I think, of little doubt. The power of the cephalotribe to diminish the size of the head in that part where it offers the greatest amount of resistance, viz., the base, is beyond dispute, and the obstetric armamentarium is certainly not complete unless it contains this instrument.

There are many varieties of the cephalotribe, British and foreign. In the form which was used by Assalini, the blades did not cross. but worked parallel, being united at the handle end: the blades are approximated by a screw in the centre. The instrument of Professor Lazarewitch (Fig. 119) is formed somewhat upon this plan also, and is a most convenient, handy, and effective instrument. It possesses the pelvic curve, and the blades are scooped on their inner sides, and are armed with three strong pyramidal projections springing from the hollow of the blades, and ending in points which are directed towards the handles (Fig. 120). These are calculated to help in breaking down the bones, and also in securing a hold for traction. When closed the blades are ⅞ of an inch apart in the middle, and at the extreme ends curve inwards so as almost to touch. This distance, then, marks the limits to which compression can be carried. The blades are 9.50

inches long. The form of the lock is that known as Assalini's, and it forms the fulcrum or centre upon which the two arms work. The compressing force is applied by means of a screw, which is carried through the shanks near their junction with the blades,

FIG. 119.

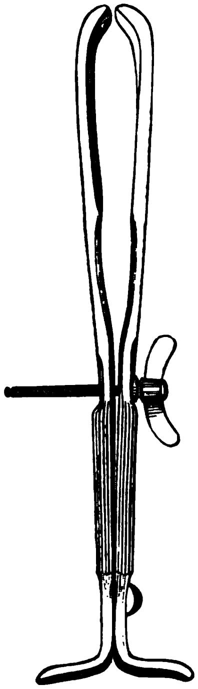
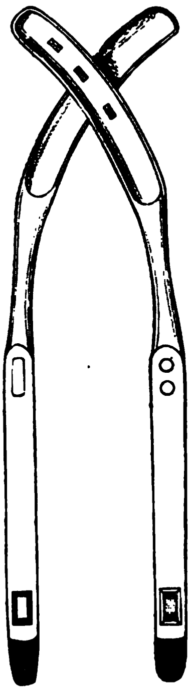


FIG. 120.



and is sufficiently removed from the blades to be free of the vagina when in use. The blades are introduced separately, and, being little more than an inch wide, are easy of application. The weight of the instrument is only 2 lbs. The points above described are all very well seen in the annexed illustrations, which, together with this description, I have copied from the *Catalogue of Obstetrical Instruments*, published by the Obstetrical Society of London.

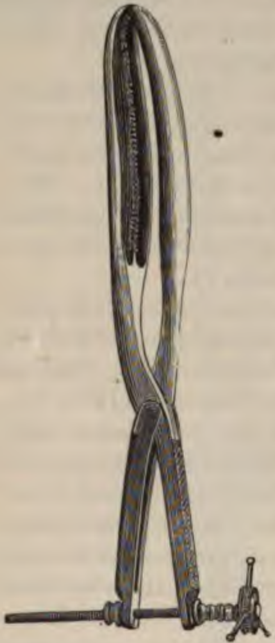
Another modification is seen in the cephalotribe of Cohen, which, in addition to its crushing power, has on the inside of each blade a knife also, by means of which the head is, as it were, bisected simultaneously with the crushing; the blades cross, the lock being also the fulcrum, and the handles are approximated by a screw which supplies the crushing power. A third modification is seen in the cephalotryptor of Professor Henning of Leipzig. This is armed with hooks on the inner surface of each blade, which are thrust out or pulled in by means of a spring attached to the handles, and are intended to grasp the head more firmly, and so to facilitate extraction after the crushing process.

It will be observed that there are two chief requisites in this instrument, first, that it should be sufficiently powerful to crush the head, even at its base; and secondly, that it should be capable of being used with safety and certainty as an extractor. Minor considerations indicate that it should be made as light as possible consistent with its requirements, and also that it should be easy of application and use in introduction, locking, etc.

Among British instruments, and I give the preference decidedly to the British over the foreign, the best are those of Sir James Simpson, Dr. Kidd of Dublin, and Dr. Braxton Hicks. Dr. Kidd prefers the straight form of blade, while Simpson and Hicks have adopted the pelvic curve, believing that it is both easier of application and less likely to slip. Dr. Kidd, on the contrary, holds the opposite view: he thinks that with a straight-bladed instrument the head can be more easily rotated, which is an advantage in the process of extraction; also, that a straight blade is easier of introduction than a curved one, especially in very contracted pelves. Again, the head is more firmly held, he believes, by a straight than by a curved instrument; and lastly, extraction is easier with the former than with the latter. In the opinion of both Simpson and Hicks these propositions are exactly reversed. They accordingly preferred an instrument with a slight pelvic curve. In the original instrument of Baudelocque, the curve amounted to 3¾ inches. Braun, of Vienna, reduced this to 2 inches, and Simpson and Hicks have adopted that curve. The other modifications of the instrument refer to size and weight, to the relative length of blade and handle, to the form of lock, and to the nature of the screw by which the compression is effected. On the whole, I believe that the instrument of Dr. Braxton Hicks, which is represented in Fig. 121, is the best and most convenient form we possess at present.

The *cases requiring the use of the cephalotribe* are in general those which render craniotomy necessary, and further, it is applicable to cases where the perforator and craniotomy forceps would most likely fail, or, at least, in which their use would be attended with great difficulty and danger. Some authorities have recommended it in cases with a conjugate diameter of only 1½ inches or even 1¼; but this appears to me to be most unsound practice, for I believe the risk to be fully equal to that of the Cæsarean section, which would at least give the child a chance of life. On the Continent, where the cephalotribe was first used, the general opinion is in favor of the limit of 2 inches, and probably that is the safest point to fix upon; though in this country 1¾ inches in the conjugate, with a transverse diameter of 3½ inches, are the dimensions which are thought fairly to justify the performance of cephalotripsy. Dr. Barnes is convinced "that cephalotripsy is quite practicable with a pelvis measuring an inch and a half in the conjugate diameter." It may be so in his hand, but I very much question if it be as a general rule; and it must be remembered that his opposition to the Cæsarean section is very determined. Nowhere, perhaps, is this more visible than when he adds in the same sentence that the risk of cephalotripsy, with a pelvis which measures in the conjugate only 1½ inches, is "*inconsiderable* compared with that attending the Cæsarean section!" [The italics are my own.]

FIG. 121.



Method of Performing the Operation.—The operation is, in all its essential features, very much the same as that for the long forceps, at least as regards the application of the blades. The patient is to be placed in the usual obstetric position, and the preliminaries are the same in both cases. In all cases in which the cephalotribe is used it is better to apply the perforator first; the head will thereby be greatly diminished, and its compression be made much easier. If possible, of course, we should try to select the point where we wish to apply the blades, but in cases of great deformity this cannot always be done, and we must then content ourselves with applying them where we can do so with the greatest facility, which, most likely, will be in the transverse diameter of the pelvis, and probably then we shall grasp the head in its longitudinal diameter. As soon as the blades are both applied and locked, we may commence the crushing by winding up the screw slowly and steadily, for this part of the operation requires time in order that it may be carried to completion.

It happens in some few cases where the pelvis is not less than two inches in the conjugate, that one application of the cephalotribe will suffice, and we may be able to make use of it as a tractor and so complete the delivery. If not, then the instrument should be unscrewed and reapplied either in another direction or in the same direction, but over another part of the head. Sometimes this requires to be repeated two or three times until the head is completely crushed; and at all times it should be borne in mind that during extraction the smallest diameter of the head should be brought into correspondence with the smallest diameter of the pelvis. When extraction is being carried out, care should be taken to guard the soft parts against injury from projecting spicula of bone.

Occasionally, indeed frequently, when the head has passed through the brim, great difficulty is experienced in extracting the trunk, and it may be necessary to perforate the chest, or to apply the blunt hook round the arm; or the small vertebral hook may do good service by being fixed on to one of the ribs, with a view to extraction from that point; or lastly, the cephalotribe may be required to crush in the chest, after which the delivery will be accomplished without further difficulty.

In the very rare cases in which, owing to the extreme distortion of the pelvis, the use of the perforator is impossible, that of the cephalotribe can hardly be considered, and the Cæsarean section then becomes the only available operation. In fact, as Dr. Hicks remarks, the cephalotribe should be regarded rather as a substitute, in the severe forms of obstruction, for the other craniotomy instruments after perforation, and not so much as a substitute for the Cæsarean section; and he adds: "It is, no doubt, very valuable both in doing away with the danger arising from spicula of bone, and from the crotchet, etc., as well as tending to shorten the duration of the operation; but if we rely upon it as an instrument capable of accomplishing the whole delivery by itself, we shall be overrating it, and exposing ourselves to disappointment." In this opinion I entirely concur. I believe that the cephalotribe is a most valuable form of craniotomy forceps, and that it diminishes very greatly the risks to which the mother is exposed in all cases of severe pelvic distortion during the process of extraction. I think, too, that by thus diminishing the risk it enables us to effect delivery with tolerable safety by this method, in cases which would otherwise be attended with extreme danger—a danger which might even exceed that incurred in the performance of the Cæsarean section.

There is yet one other operative proceeding of a destructive character, which is intended still further to obviate the necessity of having recourse to the Cæsarean section. This operation, which has not as yet received any specific name, consists in the application of the écraseur to different portions of the head, in order to remove it in sections, and so to reduce it to the smallest limits possible. Dr. Barnes, who is the author of this proceeding, states that it is designed to effect delivery "in the most extreme cases of pelvic contraction."

The operation is to be performed thus: The head is first to be perforated, and its contents evacuated so far as is possible. The rest of the proceeding is so novel and, as it appears to me, so difficult of performance, that I shall, I hope, be excused for giving the description of it at some length in the author's own words. "After perforation," he says, "the wire cuts through the skull more easily if this be done. In doing this, the head is firmly supported against the brim by an assistant. The crotchet is next passed into the hole made by the perforator, and held by an assistant so as to steady the head. A loop of strong steel wire is then formed large enough to encircle the head. The elasticity of the wire permits of the loop being compressed by the fingers so as to make it narrow enough to slip through the cervix uteri and the chink of the pelvic brim. The loop is then guided over the crotchet to the left side of the uterus, where the occiput lies; the compression being removed, the loop springs open to form its original ring, which is guided over the occiput, embracing all the posterior segment of the head. The screw is then tightened; instantly, the wire is buried in the scalp, and here is manifested a singular advantage of this operation. The whole force of the necessary manœvres is expended on the fœtus. In the ordinary modes of performing embryotomy, as by the crotchet especially, and in a lesser degree by the craniotomy forceps and cephalotribe, the mother's soft parts are subjected to pressure and contusion. The child's head, imperfectly reduced in bulk, is forcibly dragged down upon the narrow pelvis, the intervening soft parts being liable to be bruised, crushed, and even perforated. And this danger, obviously rising in proportion to the extent of the pelvic contraction, together with the bulk of the instruments used, deprives the mother, in all cases of extreme contraction, of the benefit of embryotomy, leaving her only the terrible prospect of the Cæsarean section. When the posterior segment of the head is seized in the wire loop, a steady working of the screw cuts through the head in a few minutes. The loose segment is then removed by the craniotomy forceps.

"In minor degrees of contraction, the removal of the occipital segment is enough to enable the rest of the head to be extracted by the craniotomy forceps. But in the class of extreme cases in which this operation is especially useful, it is desirable still further to reduce the head, by taking off another section. This is best done by reapplying the loop over the anterior side of the head. The wire seizes under the lower jaw beyond the ear. When the screw is worked, the wire has to cut through the base of the skull, dividing the sphenoid bone. The segment thus made is removed by the craniotomy forceps.

"The small part of the head still remaining attached to the trunk, offers no obstacle. It is useful as a hold for traction. The craniotomy forceps now seize this firmly, and you proceed to deliver the trunk. If the child be well developed, this part of the operation will require considerable skill and patience. An assistant draws steadily on the craniotomy forceps, directing traction to one side, so as to bring a shoulder into the brim. The operator then hooks the crotchet into the axilla, draws it down, and with strong scissors amputates the arm at the shoulder. This proceeding is then repeated on the other arm. Room is thus gained to deal with the thorax: you perforate the thorax, introduce one blade of a strong pair of scissors into the aperture, and cut through the ribs in two directions. Then, by the crotchet, eviscerate the thorax and abdomen, until the trunk is in a condition to collapse completely. This done, moderate traction will complete the delivery.

"I have imagined a proceeding by which the arms can be amputated even more easily. A curved tube, shaped like Ramsbotham's hook, may be made to carry a strong wire under the axilla, and the end being brought out, and the tube removed, the wire can be attached to the écraseur, which then cuts through the limb with ease and security. Decapitation may be conveniently performed in the same way.

"This operation is particularly adapted to extreme cases of narrowing of the pelvic brim from rickets, in which there is commonly left a moderate amount of space at the outlet for manipulation. Indeed, I believe a case of rickety deformity will rarely be found so great as to compel resort to the Cæsarean section."

I have given this quotation from Dr. Barnes's Lectures at some length, because in the case of an operation so novel as this, so extremely difficult of performance as I believe it to be, and withal, involving issues so momentous, it appears to me very necessary that its introduction into practice, if that is to be, ought to receive no coloring from those who feel themselves at present unable to accept it; therefore I have given it in the author's own words, and I am bound to add that I am one of those who hesitate a good deal in accepting this as a useful addition to our obstetric resources. I fully share in Dr. Barnes's dread of the Cæsarean section, and I would hail with thankfulness any suggestion which offered a reasonable escape from it; but I dread far more an operation which, from its inherent difficulties, must necessarily bring the patient who is the subject of it into imminent peril and danger—danger so great as must, I believe, very nearly, if not quite, equal that which it is intended to obviate, and which has not at the same time any redeeming feature in the shape of a possible, indeed probable, escape for the child. At present, I believe the operation has not been performed on the living subject; we have, therefore, not only no experience to guide us as regards its results, but none even as to its practicability.

PART V.

UNNATURAL LABOR.

CHAPTER I.

UNNATURAL LABOR FROM ABNORMAL CONDITIONS OF THE EXPELLING POWER.

IN the Third Part of this work I have considered the subject of Natural Labor, and, in accordance with the plan there laid down, we have now to study the second great division of labors, namely, those to which the term Unnatural is to be applied: this will leave for future consideration the third group of labors, namely, the Complex.

Natural labor, as I have already defined it, implies the delivery of a living child by the natural efforts, without complication, and with the head presenting. Unnatural labor, on the other hand, implies some deviation from this course: and this may arise from a faulty condition, either (1) of the expelling power; or (2) of the passages; or (3) of the child. Complex labors are also unnatural; but it will be more convenient to study these separately.

First then, with regard to those labors which are abnormal from a *faulty condition of the expelling power.*

The expelling power of parturition is, as has already been shown, of two kinds—the involuntary and the voluntary: the former is situate chiefly in the uterus; the latter, in the abdominal and other muscles. It may be at fault either from excess or deficiency of action; in the former case the labor may be *precipitate*, in the latter *tedious or protracted.* This same result may be brought about by a misapplication or misdirection of the force, its amount or degree being neither in excess nor deficiency.

I. *In Precipitate Labor*, arising from *excessive uterine action*, the pains are very severe; each one is of long duration, while the intervals are short: sometimes there seems to be one continuous *rôle* of uterine action, attended throughout with violent expulsive efforts and extreme suffering, and accompanied by considerable excitement and constitutional disturbance.

This condition is, according to Wigand, dependent upon either "an unusually powerful influence of the nervous system upon the contractile fibres of the uterus, or upon a morbid degree of irritability." It is sometimes hereditary, and has a certain resemblance to the pain which in most of these cases exists during the menstrual period. It is more common with nervous or plethoric subjects, and occasionally it gives rise to some cerebral disturbance.

The consequences of this state of things are sometimes very serious to the child, for it has been thrown suddenly upon the floor, the cord ruptured, and the child much injured. But the dangers to which this unnatural action exposes the mother are even more serious; for prolapsus and inversio uteri, lacerations of the uterus, vagina, and perineum, hæmorrhage, syncope from the sudden emptying of the uterus, and subcutaneous emphysema of the head and neck from the violent straining, have been the result.

But precipitate labor may also be due to *deficient resistance to the expelling powers;* and this may occur either from great relaxation and want of tone in the maternal structures; from a large pelvis; from the child being smaller than usual; or from its head being imperfectly ossified.

A case is mentioned by Deventer, in which, the pelvis being very roomy and uterine action strong, the uterus was actually forced so far beyond the external parts that though the head of the child only just protruded from the os uteri, its shoulders were external to the pelvic outlet. A similar case occurred in my practice at St. Mary's Hospital. The patient had suffered from procidentia uteri to a rather extreme degree. There was strong uterine action. The parts were extremely lax, and the child was driven out of the pelvis, so that the head projected beyond the external parts; the uterus was, however, also protruded with it, so that the lower third or cervical zone of the uterus, was completely external and expanded over the child's head; the os remained, however, undilated. Forceps were applied, and as much force as was justifiable was used, but it really seemed as if the whole uterus would be pulled out, and still delivery was not effected. Meanwhile the cervix began to get greatly discolored, and to put on the appearance of strangulation. At last, fearing that something disastrous to the mother would occur, and all attempts to extract the child failing, I was obliged to perforate the head and deliver, though all this time the head of the child was literally beyond the external parts, in fact, to put it in Irish fashion, it had escaped from the internal parts. Dr. Rigby mentions a case of deficient resistance in which "the patient, a healthy woman, had only two pains—the first awoke her out of a sound sleep and ruptured the membranes, the next drove the child with great violence into the bed."

The *Treatment* of precipitate labor is necessarily somewhat unsatisfactory, inasmuch as the mischief usually takes place before the patient is seen. We may, however, where there is a known tendency to it, do something by way of alleviation. Opium, from its calming action upon the uterus, is of great value where there is excessive action—it should be given in full doses. The patient should also be directed to desist as far as possible from all expulsive efforts. Much good will sometimes result from a bandage being firmly applied round the abdomen; this has the effect of moderating uterine action, while it also affords support to the uterus. In cases where the uterus is driven down beyond the external parts, Naegele used a sort of T-bandage, supporting the os firmly, and having a hole made in it, through which the child may be made to pass. Some authorities have advised bleeding to syncope, and the application of cold by affusion to the abdomen and legs; the latter, however, seems a very questionable proceeding, for it is well known that cold is a most powerful excitant of uterine action, at all events during the shock of it: possibly if no harm resulted from it at that stage, its subsequent depressing effect might be beneficial. Bleeding seems to offer a better chance where there is extreme irritability and excessive uterine action; but the blood would require to be drawn in a large stream, so as to produce its effects rapidly, and it need hardly be said that such a remedy should only be resorted to in exceptionally urgent cases.

The kind of treatment which, looking to the fact that uterine action is, to a great extent, if not entirely, a reflex phenomenon, would appear to be most indicated, is that which aims at calming reflex excitability; such remedies, therefore, as conium, belladonna, and ice to the spine, seem to offer greater advantages. Neither of these remedies has ever been tried, so far as I am aware.

II. *Tedious or Protracted Labor*, from abnormal conditions of the expelling powers, may arise in many different ways, and may affect the progress of the labor in either of its three stages.

When it occurs during the first stage, according to Denman, "neither mother nor child is ever in danger (except in hæmorrhage or convulsions) on account of the labor." This opinion, however, cannot now be rigidly maintained, because undoubtedly dangers to the mother do arise in the course of protracted first stage; and in the second stage, delay, if protracted beyond a certain time, is often fatal to the child, and seriously prejudicial to the mother. The following are the principal causes of protracted labor from faulty expelling power: 1. Deficient uterine or involuntary action. 2. Defective action of the voluntary muscles. 3. Misdirection of the force applied.

1. *Deficient uterine action.* This may arise from general debility, from disease, or other derangement of the digestive organs, mental emotion, peculiarity of age, temperament, from rheumatism, inflammation of the uterus, plethora of the uterus, or from the presence of some organic disease in the uterus itself, impairing, or altogether checking its action, such as cancer, cicatrices from previous disease, fibroid tumors in its substance, etc.

General constitutional debility is by no means an uncommon cause of tedious labor, especially in this metropolis, and it is met with in very opposite conditions of life: among the poor, it arises from improper or insufficient food, and the host of causes which tend to lower their vital power. Among the upper classes, it occurs as a result of general inactivity, and the artificial habits of life common among most of that rank. Sometimes it is the result of previous exhausting disease, loss of blood, long-continued diarrhœa, or other debilitating discharges. It shows itself in a relaxed and weakened condition of the uterine fibre, and a consequent feeble power of contraction.

In a few cases, this deficient uterine action is caused by some disorder of the digestive functions. The sympathy between the uterus and digestive organs is very great in pregnancy; it may be seen from the very first commencement of gestation in the morning sickness, and other symptoms. Whenever labor is affected by derangements of this kind, there is generally some abdominal pain and tenderness independent of the uterine pain; sometimes the abdominal muscles are hard and tense, and the pain is of a colicky character; very often "the os uteri is thin, tense, and rigid; the vagina is hotter than natural; the secretion of mucus is sparing; and both os uteri and vagina are more than usually tender to the touch."

In persons far advanced in life, especially if pregnant for the first time, or who have had very large families, uterine action is often slow and inefficient. So, too, in females of strongly phlegmatic or strumous temperament, the uterus partakes of the same atonic condition which is common to the entire muscular system.

Gouty and rheumatic constitutions are very inimical to powerful uterine action, and this not so much on account of any want of power as from the excessive pain and irritability which these conditions induce. The pains are short, sharp, and rather of a spasmodic character, "niggling," as the nurses will sometimes call them; while at the same time the uterus is very tender to the touch.

Lastly, inflammation of the substance of the uterus may occasion deficient contraction; it may even arrest it altogether. This condition is happily of rare occurrence, for it is generally very serious, as may be supposed, from the great vascularity of the organ. "The slightest contractions of the uterus produce intense suffering: the vagina is hot and dry, and very tender to the touch—its mucous secretion suppressed; the os uteri is swollen, tense, and painful, and the anterior lip is sometimes so distended as to have been actually mistaken for the bladder of membranes; the bowels are confined; the urine is suppressed; the abdomen becomes distended from tympanitis; and general, and probably fatal, inflammation of its contents follows" (*Rigby*).

The *Treatment* of protracted labor from deficient uterine action must necessarily vary with the cause, and as a general rule we have only to find out the cause in order to discover the remedy. In weak, nervous, and debilitated subjects, we should, if possible, before labor comes on, do what we can to bring up the strength to a healthy standard, by a generally tonic plan of treatment both as regards diet, medicine, and hygienic means: during the labor the strength should be supported as much as possible by wine and strong beef tea; the patient should be comforted with the assurance that all is going on well; and she should be enjoined, especially in the early stage, to desist from any straining efforts.

Supposing that there is no more specific cause for the delay than such as arises from deficient uterine action consequent on general or local debility, then much good may result from the adoption of the method originally suggested by Ritzen in 1856, and practiced very successfully by Kristeller in 1867, viz., the application of firm pressure upon the fundus and body of the uterus externally. Dr. Playfair has lately directed attention to this subject, and published two cases in which it was entirely successful. The idea is to, as it were, "*push* the presenting part through the pelvic canal in cases in which the forceps would otherwise be required to *pull* it through; to apply, in fact, a *vis a tergo*, instead of a *vis a fronte*." Alluding to one of his cases in which this method was resorted to, Dr. Playfair writes: "The patient being laid on her back, and the hands being spread out on the sides and fundus of the uterus, firm downward pressure was made in the axis of the brim at the commencement of each pain. The good effects of this manœuvre were very striking. The first pain was manifestly increased in strength and duration, and the head was felt to advance decidedly as it was pushed down. The contractions were increased greatly in force, and in about six pains the head was expelled." There can be no doubt, I think, that this method is capable of affording great assistance in cases of lingering and powerless labor where the presentation is natural, and the pelvis roomy. At the same time, care is necessary to prevent any rough usage, which is sure to lead to mischievous consequences, and the conditions above mentioned must in all cases be observed.

If there be evidence of any disorder of the digestive organs, an aperient, or better still, an enema, should be administered. There is, perhaps, scarcely anything which directly or indirectly tends so much to retard labor as an overloaded state of the bowels. If this is situate low down it may act as a positive obstruction; if higher up, or if, though not overloaded, the secretions are disordered, acrid, or otherwise offensive, the reflex irritation is sure to impair uterine action and to give rise to spurious much more than genuine contractions; the pains are griping, spasmodic, brief, and irregular, and no progress is made in the labor until the offending matter is removed either by an emetic or purgative, or by an enema.

In labor impeded by rheumatic or gouty irritation, the treatment will be pretty much the same as in those diseases under other circumstances. The patient should be prepared beforehand, if possible, by a free administration of alkalies, and during the labor liberal draughts of solution of acetate of potash with five, ten, or fifteen grains of Dover's powder, will generally be found sufficient to give relief. Warm fomentations to the abdomen, or a warm bath, will also be of service, and occasionally friction with opiate embrocations will do good.

In persons of full and plethoric habit, where the uterus is acting slowly and imperfectly from an overloaded state of its vessels, much good will often result from venesection; it not only relieves the uterus, thereby enabling it to act more freely, but also diminishes the liability to serious hæmorrhage, which might otherwise ensue on the separation of the placenta; at the same time it facilitates dilatation of the passages.

Should this condition run on, as it is liable to do, to inflammation, the danger is vastly increased, and the amount of suffering becomes almost unbearable. Blood must now be taken freely from the arm, and warmth and moisture be applied in the form of fomentation or poultice to the abdomen. The skin should also be acted on by diaphoretics, and great benefit will result from the exhibition of opium, which is best given in the form of enema.

Occasionally it appears as if the want of uterine action arose from general or local irritability, without any special taint of the blood, but simply from a high degree of nervous excitability, especially in hysterical subjects. In such cases a good dose of opium, or henbane, or better still, the inhalation of a small quantity of chloroform or ether, will render signal service. The subcutaneous injection of morphia is also very effective in these cases; it acts speedily and well. If possible, sleep should be procured, the effect of which will most likely be to produce a complete change in the character of the labor.

Where the irregular or disordered action is in consequence of organic disease in the uterus, little can be done by medicines; probably chloroform will be the best remedy to restore and regulate the uterine contractions, and artificial delivery should, if needed, be resorted to.

It is often very difficult to discriminate between the various conditions which occasion deficient or irregular action. Pain must not always be taken as indicative of strength in the contractions; there is often great pain with very little strength, and it will require close investigation to arrive at a conclusion which could be of service in determining the proper treatment.

If it be desired to increase uterine action, then those drugs which are known to excite this action must be used. They are, however, contraindicated in the following conditions: 1. Wherever there is rigidity of the os uteri. 2. In all abnormal presentations. 3. In cases of deformed pelvis, from whatever cause arising. In short, *wherever there is serious mechanical obstruction arising either from the soft parts, the pelvis, or the child, there ergot is contraindicated.*

The ergot of rye is the chief remedy of this class; it may be given in scruple or half-drachm doses of the powder, or in half-drachm doses of the liquid extract of the British Pharmacopœia, repeated every half hour for three or four times until some result is obtained. Its effects are usually manifest in a few minutes.

Borax, cinnamon, Indian hemp, uva ursi, croton oil, and turpentine are other remedies of the same class as ergot, and are said to possess similar properties; but, with the exception of the two first named, I am not aware of any evidence which would lead one to recommend the adoption of either of them in preference to the others.

One caution is necessary in administering any of these drugs, and especially ergot, namely, not to repeat the dose too frequently or too quickly until its effects in the particular case have been well ascertained, for by so doing we may at last get most violent action, such as we may be quite unable to control, ending possibly in some serious laceration of the uterus, vagina or perineum.

2. The second cause of Tedious Labor from abnormal condition of the expelling power arises from an

Impaired Action of the Abdominal Muscles.—This may be due to exhaustion, either from long-continued pain or from previously existing disease, especially of the respiratory or circulating organs; as in cases of asthma, pneumonia, bronchitis, etc., or from the presence of dropsical fluid in the abdomen.

3. Lastly, labor may be protracted, not from any want of expulsive effort either in the voluntary or involuntary muscles, but from

Misdirection of the force applied, as in cases of obliquity of the uterus, where the long axis of the uterus does not correspond with that of the pelvic brim, but is directed to one or other side. It has been supposed that the uterus sometimes inclines to one side, according to the position of the patient, and so is diverted from the proper axis. Again, the abdominal walls may, from mismanagement during previous pregnancies, or from local debility, have become so relaxed that the condition termed pendulous belly may have resulted, in which case the fundus of the uterus is thrown forwards, and the os is directed upwards and backwards against the sacrum, the uterine and pelvic axes again diverge, and delay is the result.

Either of these conditions may be diagnosed by noting the direction and position of the os. In the former case it will be found directed to one or other side; in the latter it will be so high up in the pelvis as scarcely to be within reach at all, and, if felt, will be found looking directly backwards towards the promontory of the sacrum.

The *Treatment* in either case is the same in principle, viz., to restore the uterus to its proper position, and to maintain it there by means of a bandage firmly applied round the abdomen; if need be, it should be held there by an attendant. In the case of pendulous belly, giving rise to the condition known as anteversion of the uterus, in addition to the bandage, good often results from placing the patient on her back, thus throwing the body of the uterus backwards; by this means the os will be directed more towards the axis of the pelvic brim.

Dr. Protheroe Smith has described a new pelvic band of which he speaks very highly as an aid to parturition in those cases where the force exerted during labor is either misdirected or otherwise faulty. He remarks in reference to the twofold force naturally employed, that, according to the experiments of Professor Haughton, the voluntary muscles perform $\frac{9}{10}$, and the involuntary $\frac{1}{10}$, and that together they are expressed by $\frac{1}{4}$ of a ton weight available at parturition in the normal state. The first division of these forces is often wanting in effective power in consequence of the usages of civilization requiring the clothes of females to be suspended around the waist by a cincture, through the pressure of which the lumbo-abdominal muscles degenerate so as to be incapable of performing their part in the act of expulsion. Hence the civilized woman is too often defective in the acts both of parturition and defecation. In imitation of nature's apparatus Dr. Protheroe Smith has devised his fixed pelvic band, which is designed to offer all the *points d'appui* presented by the skeleton for the employment of muscular force in parturition. The advantages claimed for this apparatus by the author are the following: "1. A fixed point is secured for the exercise of mechanical force by means of, as it were, an artificial skeleton, the immobility of which is secured by two pads, one sacral, the other pubic, retained in their respective places by lateral springs, which embrace the pelvis below the cristæ iliorum. 2. Then, a fixed point having been gained, attached to the sacral pad are two vertical levers, and one horizontal. The former end each in a costal spring, embracing the thorax, and united by a sternal pad, so arranged as not to incommode the chest in respiration; the latter, or horizontal, is a powerful spring, buckled to a belt closely adjusted to the abdominal walls, and connected above to the costal springs and below to the pelvic band by elastic rings or tapes. It is thus constructed so as to act in the manner of the abdominal muscles. During the parturient pains, this belt is readily tightened at will, to assist or supply the place of the voluntary muscular contractions, and is as readily relaxed in the intervals of pain. When required, it may be made to maintain a steady uniform pressure, as is often needed post partum. This force reacting upon the sacral pad, affords to the patient that support in the lumbar region which is so much called for during labor, and which is usually supplied by the hands of the nurse." I have given this quotation at length, partly because in description of this sort the author's text is the best guarantee for accuracy, especially where, as in this case, it refers to somewhat complicated mechanism, and partly because the subject is one of real importance. I have not, however, had an opportunity of testing its application, but it appears to me to bear directly upon the mechanical difficulties of that form of unnatural labor which I am now considering, and it is possible therefore that the instrument may obviate them, in which case it certainly would confer a great boon on the parturient female. By the kindness of the author I am enabled to give the subjoined illustrations representing the several parts of this apparatus. Fig. 122 shows the instrument complete as seen from behind; *a* is the sacral pad, *b* the pubic, *c c* are the steel bands which embrace the pelvis below the crest of the ilium on each side, *d d* are the perpendicular spinal springs which arise from the sacral pad and terminate just below the scapulæ; *e* is a transverse spring. In a more recent improvement the parts marked *a*, *d d*, *e*, are made in one piece, and capable of being moulded to the form of the patient; *f* is the abdominal belt, *g g* are the two costal springs, and *h* is the sternal pad.

FIG. 122.

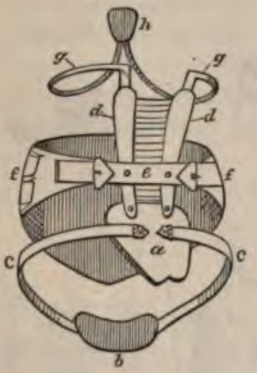
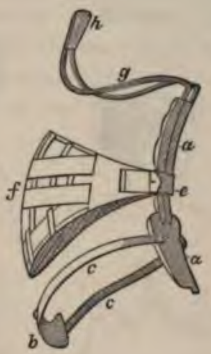


FIG. 123.



In Fig. 123 the instrument is shown in profile from the left side, the parts lettered being the same as those shown in Fig. 122. Fig. 124 represents the ordinary abdominal belt, and Fig. 125 the obstetric or midwifery belt. *a a* are the straps by which it is fastened to the extremities of the transverse spring *e* in Fig. 122, *b b* are the upper, and *c c* the lower running straps to contract the belt when fastened to the hooks *d d*.

FIG. 124.

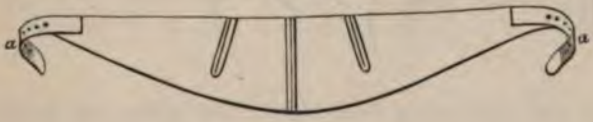


FIG. 125.

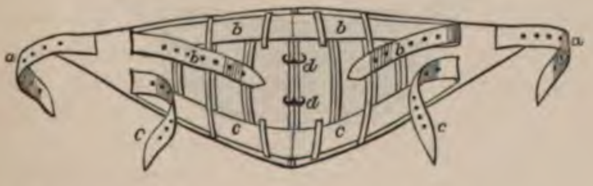


Fig. 126 represents a front view of the pelvic band, adjusted to the figure so as to exhibit its relation to the body.

Fig. 127 shows the same in profile.

Fig. 128 a back view of the same.

FIG. 126.

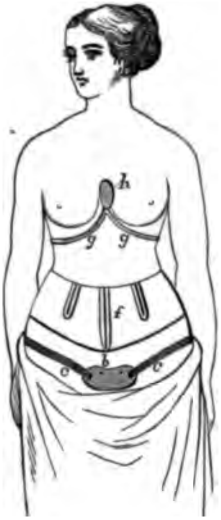


FIG. 127.

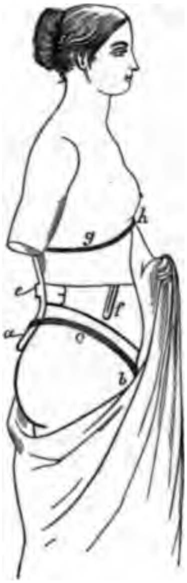


FIG. 128.

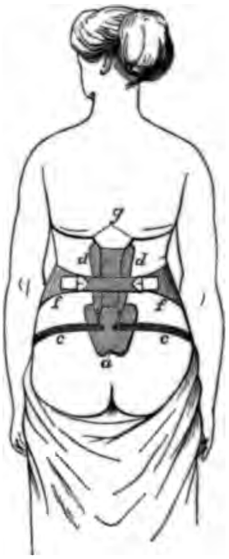
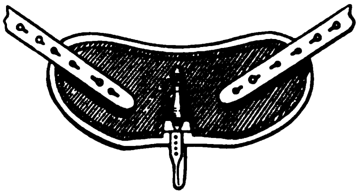


Fig. 129 represents a front view of the pubic pad, fitted with a ratchet and catch to carry an intrauterine stem or any other form of pessary.

FIG. 129.



There is yet one other form of tedious labor from fault in the expelling power, to which Dr. Rigby gave the name of *Stricture* *of the uterus.* It consists of a spastic rigidity of the organ, with partial spasmodic contractions, giving rise sometimes to a sort of hour-glass contraction, "having a transverse circular indentation, as if it had been tied with a cord." It may affect one side only, and "is capable of producing a most serious obstacle to delivery."

The *Treatment,* according to the same authority, consists in administering a gentle laxative or an enema,; bleeding, if it seems indicated; and opiates. The warm bath is also of great service, and chloroform or sulphuric ether would probably be useful.

CHAPTER II.

UNNATURAL LABOR FROM ABNORMAL CONDITIONS OF THE PASSAGES.

THE second division of unnatural labors includes all those arising from a faulty condition either of the soft or bony parts of the pelvis. They are very various, and form a most important class of difficult labors.

1. *Rigidity of the Os Uteri.*—To a certain extent, nearly every os uteri may be said to be rigid. Especially is this the case in primiparæ, and in persons pregnant for the first time at an advanced period of life. Generally, however, time and uterine action suffice to remove this obstruction; in other words, to relax and dilate the orifice: but in that form of rigidity of the os which I am now considering, many hours may be spent with strong uterine action, and yet not the slightest dilatation is effected. The orifice may be dilated to the size of a shilling, half a crown, or more, but beyond that no advance is made. Meanwhile the patient is becoming exhausted, and as a consequence the pains are beginnning to grow more and more feeble.

This form of rigidity may arise either from functional derangement of the digestive organs, giving rise to a kind of spasmodic action of the uterus, or it may depend upon some organic alteration in the uterine tissues themselves.

In the simpler forms, the os and cervix are found to be thin, contrary, perhaps, to what might be expected, hard and very unyielding. If the head has been pressing down for some time, and especially if the liquor amnii has escaped, the os may become thick and soft from œdema, but it is still very undilatable, and the pains exercise little or no influence upon it; the parts begin to get hot and dry, the pulse quickens, the skin is hot, the tongue dry, brown, and coated, and the patient gives evident indications of failing strength.

In the *Treatment* of this condition the practitioner must be guided by the circumstances of each case. The remedy which will be found of greatest service as a general rule, is tartar emetic, given in small slightly nauseating doses, and frequently repeated, but not so as to excite actual vomiting. As soon as the constitutional effects of the drug are manifest, the rigidity yields in most cases readily. Sometimes it appears to act better when combined with opium. At other times its action is facilitated by saline purgatives, especially in cases where there is evidence of gastric derangement, foul tongue, offensive breath, constipation, etc.

Opium alone is of the utmost value: it calms the nervous system, allays the pain, and induces sleep: and frequently after a few hours' rest the patient will awake greatly refreshed, uterine action proceeds with more vigor, and the previously rigid state of the cervix uteri yields readily to it.

Chloroform is another very valuable remedy; so powerful, indeed, is its relaxing effect sometimes, that I have seen cases where turning had been attempted and failed, from inability to introduce the hand, owing to great rigidity of the uterus, and where chloroform has rendered the operation perfectly easy. So in cases of rigid os, especially with irritable and nervous people, when the pains are short, fidgeting, and irregular, chloroform relaxes the os and regulates uterine action in a remarkable manner, so that labor afterwards progresses quite satisfactorily.

Bleeding is strongly recommended by many authorities, especially in stout plethoric subjects. The blood requires to be taken rapidly, by a full stream from the arm, to the amount of twelve or sixteen ounces. I have never yet resorted to this practice, fôr I have never seen a case which did not yield to one or other of the above remedies; and I should much prefer their temporary effect for the purpose in view to any general depletion, the evil effect of which must be felt by the constitution long after, and may predispose to future mischief. Of course, the objection does not apply equally to all cases; where there is evidence of great plethora, a full, bounding pulse, flushed face, and general turgescence of the capillary system, then probably depletion would do great good.

Throwing up a stream of warm water against the cervix uteri by means of a syringe, as has been recommended in the case of the induction of premature labor, is another valuable agent. It should be continued for about ten minutes each time, and be repeated every quarter or half hour until the desired result is obtained.

The local application of belladonna, and mucilaginous injections are also recommended. It is quite conceivable that the former might be useful, but it is obviously a remedy that requires to be used with extreme care, lest its poisonous effects should become manifested. I should prefer using it in the form of vaginal pessary, just as I am in the habit of doing in the treatment of some uterine affections. The basis of these pessaries is gelatin and glycerin in the proportion of 1 part of the former to 4 parts of the latter. This is a very convenient form, it avoids the greasy discharge which the cocoa butter entails, and is altogether pleasanter to use. Two or more grains of the extract of belladonna may be thus introduced into the vagina; it soon melts and is absorbed, so that it requires watching.

In certain cases, however, none of these means will suffice, and artificial dilatation either with the hand or by means of the air or water dilating bag may be required, or an incision may be necessary. The process of dilatation is to be carried out thus: Insert one of the smaller sized india-rubber bags within the os uteri, so that the constricted portion is as it were held by the contracted os, then gradually inflate the bag, either with air or warm water, until it is found to press firmly and forcibly round upon the rigid os. In this position it should be maintained until such time as the os yields; the bag may be distended to the full, and larger and larger bags may be required until the necessary dilatation is effected, which should be in about two or three hours at most. Care should be taken to empty the bags before withdrawing them. These bags generally dilate more rapidly than the sponge or sea-tangle tent, but the slower process of the latter may possess advantages and be more effective than the former.

But supposing that the cervix is too rigid to yield even to any of these measures, and that the constitutional suffering is beginning to be severe, other measures must then be had recourse to; for if uterine action continues strong, the uterus may rupture, or the cervix may be torn away, or the patient's strength may fail, and fatal exhaustion set in, death ensuing either before or soon after delivery.

The treatment now required is to incise the cervix, and thi may be done by means of a blunt-pointed bistoury carefully introduced under cover of two fingers. The incisions should be made very cautiously, so as not to go too deeply: from a quarter to half an inch is generally sufficient, and this may be repeated in severa directions, so that in the subsequent dilatation there be no laceration in one direction, but a gradual and uniform yielding all round. If, after these incisions are made, dilatation is not effected possibly from the want of uterine action, the dilating bags may be had recourse to, and ergot, if necessary, may be given. Then, if labor be not subsequently terminated by the natural efforts, the forceps may be applied. Great care and cleanliness are required in the after-treatment of cases where the knife has been used, in order to avoid absorption of fetid matter; the vagina should be washed out with warm water, and Condy's fluid or carbolic acid or some other disinfecting liquid, as often as every four, six, or eight hours.

This treatment, though strongly demurred to by some, is certainly preferable to the forcible dilatation and almost certain laceration of the os by the hand, forceps, or other instrument; and though I am unable to agree in the opinion of an eminent authority who has recently written on this subject, that the operation in question is "free from danger," I am satisfied that we ought not to be deterred from resorting to it by too great a dread of evil consequences.

2. *Organic Diseases of the Os Uteri.*—There are several diseases coming under this head which require the most careful attention of the practitioner; they all act as causes of tedious labor; they often present extreme difficulty as regards treatment; and they generally render operative interference necessary. They are, cancer of the os and cervix; agglutination of the edges of the os, apparently from previous inflammation; hard and unyielding cicatrices; or, lastly, the circumference of the os may have been the seat of previous inflammatory deposit, leaving a thickened and indurated condition, the os resembling rather a cartilaginous than a muscular ring. Such a condition may result from sloughing in former labors; or, as I have once seen it, from the mal-administration of caustics to the cervix.

The *Diagnosis* is not, as a rule, very difficult; cancer is known by its indurated, and generally ulcerated surface, by its peculiar discharge, which is most frequently fetid, and by the previous history and appearance of the patient. In the case of obliteration of the os from agglutination of its edges, the main point of difficulty is of course the inability to detect any orifice, even after many hours of labor, and though the lower segment of the uterus is driven down into the vagina; sometimes we are able through the thin-stretched wall of the uterus to feel the presenting part, but no indication anywhere of an opening into the uterus. For the detection of the other conditions above mentioned the finger will suffice, aided probably by a history of previous uterine disease.

In all these instances except the first, cancer, it will be right, for a time at least, to give a fair trial to nature's efforts; for even in the case of agglutination of the os, uterine action has been known to effect an opening and subsequent dilatation, so that the labor was completed by the natural process. We ought not, however, to trust to this too long, especially when the contractions of the uterus are violent and frequent, without any corresponding advance; for it is just in these cases that collapse from exhaustion, rupture of the uterus, or laceration of the cervix, has taken place.

Treatment.—If, therefore, no progress is made, if no good results from tartar emetic, chloroform, opium, and, if you will, bleeding, then the bags or tents, with or without the bistoury or scissors, must be applied.

If it be a case of *agglutination*, probably a small cut in the centre of the most depending part will suffice; the contractions will complete the dilatation, and so terminate the labor. It is a good rule always at first to try the effect of a very small incision, which, if nature afterwards proves unequal to the task of completion, can always be enlarged.

In the case of hard, unyielding cicatrices, the incisions will almost certainly require to be more free; while in those instances where no orifice can be detected, a slight puncture must be made first, and this should be done in the interval between the pains, taking care not to injure the child; it should be made a little posteriorly, and as nearly as possible in the natural position of the os. In the case of indurated cicatrices, in making an incision care should be taken to select the spot where tension is greatest during a pain; a blunt-pointed bistoury should be applied to this part during uterine action, when the contraction will be found to gape open on the slightest touch with the knife.

As in all these cases we have a reasonable hope, not only of saving the child, but also of the mother's recovery—for happily, these operative interferences, if carefully managed afterwards, are less fatal than might be supposed—the treatment to be adopted is more easily determined and with less pain to the practitioner than in those more serious and, at the same time, necessarily fatal cases of *carcinoma uteri*. Here the question is much narrowed if the child be dead, to ascertain which a most careful examination should be made with the stethoscope; and if this is found to be the case there need be little hesitation about opening the head, or reducing the size of the child in any way we can so as to facilitate delivery with as little suffering and injury to the mother as possible. Where incisions are necessary in cases of cancer, it is found that afterwards the disease makes much more rapid progress than before; should the child be living, however, we are bound to regard its life as of more value than the mother's, seeing that she has a disease which must ere long prove fatal to her. Accordingly, our efforts should be chiefly directed towards saving the child, though, of course, at the same time, we should spare the mother as much as possible. One of three things may be done—either incisions may be made into the cervix, and the case be afterwards left to the natural efforts; or delivery may be attempted by turning, with or without incisions; or the forceps may be applied under similar circumstances; or, lastly, if the disease be so extensive as to involve the whole course, and to present an insuperable difficulty to the delivery of the child except by some mutilating operation involving the child's life, then I do not hesitate to say that we have no right to sacrifice the child, we ought to abandon the idea of extracting it *per vias naturales* and resort to the Cæsarean section. I have seen mutilated children pulled almost piecemeal through a mass of cancerous disease, the unhappy mother succumbing in a few hours! Surely it is far better where the mother has an incurable and necessarily shortly fatal disease, to endeavor, at least, to rescue the child by the Cæsarean section. I believe the risk to the mother is little, if at all, greater.

Proceeding down the canal we come to—

3. *Cicatrices or Contractions of the Vagina.*—In the second stage of labor, the first having terminated satisfactorily, with the full dilatation of the os, with or without any artificial interference, the head may be prevented fully descending into the vagina by the presence of firm cicatrices or contractions in that region. The former are generally the result of sloughing or other injuries received during previous labors, and will necessarily vary in extent. There may exist only a small simple band, or almost the entire vaginal canal may be involved, and in that case there is perhaps no more formidable obstacle to labor, nor one attended

with more disastrous consequences; for both in labor as well as in the non-pregnant state, there seems to be a peculiar fatality attending all surgical interference with *vaginal* deformities.

This condition must be carefully distinguished from mere contraction or narrowing of the vagina, which is a congenital defect, due probably to arrested development, and not the result of disease. Here there is simply smallness of the canal, which, except that it is also often somewhat hard and unyielding, is in other respects healthy. It usually yields to time and uterine action, aided by a warm bath and the other remedies recommended for rigidity of the os uteri, especially the air or water bags, but it may be necessary to apply the forceps if the patient's symptoms call for any assistance.

It is different, however, in the case of *vaginal cicatrices*, which are always very tough, hard, and unyielding; they do occasionally, though very seldom, and never except they are in slight degree, yield to the pressure of the head, and the remedies used for relaxing these parts; and they may be much benefited, especially if seen some time prior to labor, by the use of sponge-tents, bougies, or the water-bags; but failing this, recourse must be had to the knife. This should be guarded with lint, except at the cutting part, and should be carefully directed against those parts which, *during a pain*, are found to be most on the stretch, and therefore most obstructing. It may be necessary to repeat this process again and again in different parts, and perhaps ultimately the application of the forceps or the performance of craniotomy may be required.

4. *Unruptured hymen*, though occasionally met with during labor, is seldom a cause of delay, for if it be not broken by the vaginal examinations, it will generally yield, though it is sometimes very tough, to the pressure of the head and the propulsive force of the uterus.

5. *Rigid perineum* is not an infrequent cause of tedious labor, though it seldom requires any interference. It has, however, been recommended to make a small incision a little on either side of the median raphé, in order to prevent laceration during the passage of the head when the parts are found to be more than usually hard and unyielding. It is thought that a clean incised wound is better for healing afterwards; moreover, by this proceeding the operator is able to select the line of incision, instead of leaving the rupture to take any course it chooses, and when it

might possibly run into the anus through the sphincter. It is just possible, no doubt, that this proceeding may in some very rare instances be necesssary, but in the great majority of cases I am sure that gentle support, so as to delay for a time the passage of the head till the parts are well prepared for it, together with the local employment of unctuous substances, and the administration of tartar emetic, opium, or chloroform, will as a general rule, be found to effect all that is required.

6. *Diseases of the External Generative Organs.—Thrombus.*— Cases are occasionally met with in which the veins of one or both sides of the vagina and labia become enormously distended and varicose. This condition is often associated with extensive varicosity of the veins of the legs, and seems indeed to be an extension upwards of this condition. I have met with several instances in which this was the case. Sometimes it only comes on during labor, while at other times it exists throughout the pregnancy.

It is quite possible that such a state as this might give rise to serious obstruction in labor, but as a general rule the chief danger lies in the liability of the veins to burst under the influence of the increased distension which occurs at that period. The rupture may either take place externally and occasion very profuse hæmorrhage; or, as more commonly happens, the rupture takes place subcutaneously and blood is effused into the cellular tissue about the vagina and labia; it may even spread over the pubis and buttocks. To this condition the term thrombosis has been given; the tumor is generally formed very rapidly, but it sometimes comes on more slowly.

Treatment should, if possible, be commenced before labor sets in; it consists chiefly in the local application of cold, support by means of a bandage, rest in the recumbent posture, gentle purgation, and tonics with mineral acids. During the labor, equable compression should, if possible, be applied, so as to empty the veins; cold and astringent applications will also be serviceable. Should the swelling appear to obstruct the labor, and there is danger of rupture taking place, we should endeavor to terminate it as quickly as possible either by turning or by the forceps, or, if the child is certainly dead, by craniotomy. If rupture has taken place, and hæmorrhage, either external or subcutaneous, is going on, cold styptic solutions should be applied, with a compress over the lacerated part. In some cases where blood is effused and the parts tumefied by it, a puncture has been made and the fluid evacuated before or after coagulation took place. This practice has, however, sometimes been far from satisfactory, in consequence either of severe hæmorrhage at the time or violent inflammation afterwards. Some have made an incision for the purpose of arresting the hæmorrhage by the direct application of a styptic to the bleeding vessels.

7. *A dropsical state of the labia and nymphæ* may give rise to much annoyance and suffering, and retard to some extent the progress of labor. As this condition is always the result of pressure, of course the sooner the pressure can be removed consistently the better. A few small punctures into the distended tissues will generally suffice to draw off a large quantity of fluid, and in most cases affords very marked relief. There is, however, the same objection to this mode of treatment as to the puncture of all œdematous swellings, that they are apt to take on afterwards unhealthy inflammation, with sloughing. Dr. Rigby used to advise the application of stimulating substances so as to excite the absorbents; and for this purpose a poultice of chamomile flowers answers very well.

8. *Tumors in the pelvis* may obstruct labor to such a degree as to necessitate some of the most formidable operations in obstetrics. These tumors are as various in size and consistency as in their nature. They may occupy any position in the pelvis, be movable or fixed, fluid or solid, fibrous or bony, and be attached either to the ovary, uterus, bladder, rectum, or pelvic wall. The amount of danger will vary with the size, situation, degree of mobility, and consistency.

Exostosis is perhaps the worst form of pelvic tumor, not only from its hard and unyielding nature, but from its immobility. Fortunately, however, it is the rarest of all pelvic tumors. Wherever it may be situate, it is certain, if of any size, so to contract the pelvic dimensions that safe delivery of the child may be quite impossible. It is easily diagnosed by its hard, nodulated feel, its firm attachment to the place of its growth, its insensibility, and by its not possessing any of the characters common to the other kinds of tumors. The only thing perhaps for which it could be mistaken is calculus in the bladder, rendered immovable by pressure of the child's head. Here, of course, situation is of value in reference to diagnosis, as exostosis of the anterior part of the pelvis is very rare, but of course the use of the bladder sound will speedily clear up the case.

The *Treatment* of this condition must be regulated simply by the size and situation of the tumor; if it be small and situate on one or other side of the sacrum, the child may be delivered either by the natural efforts or by the forceps, but if the pelvic diameter is too contracted to admit of either of these, then craniotomy or the Cæsarean section must be resorted to. It is scarcely necessary to add that in such a case the induction of premature labor would be the proper course to adopt if the case were seen some time previous to the end of gestation.

Ovarian tumors, though rare, are much more common than bony growths. They consist either of fluid, fibrous, or cancerous matter. They vary a good deal in position, and may occupy either side of the pelvis or lie between the rectum and uterus. They are generally more or less sensitive, sometimes acutely so, especially when at all inflamed. They are usually movable, of rounded or ovoid form, and generally fluctuation may be felt in them. Dr. Braxton Hicks has brought forward in the eleventh volume of the Obstetrical Transactions six cases of ovarian disease complicating pregnancy, and in their seven pregnancies delivery was effected naturally "without any serious accident to mother or children." In the same volume Mr. Spencer Wells makes the following remarkable statement: "I know one woman who during the slow progress of an enlarging ovarian cyst, has gone through five pregnancies, has borne five living children without unusual difficulty, and has never yet had the cyst tapped, nor has labor ever been prematurely or artificially induced. . . . In another case where I performed ovariotomy successfully fifteen months after the birth of twins, the patient had begun to enlarge six months before marriage, and had only suffered from her excessive size during this pregnancy. Another patient, upon whom I performed ovariotomy with success in the fourth month of pregnancy, after rupture of the cyst and peritonitis, had borne six living children during the progress of the cyst before its rupture." Mr. Wells, of course, fully admits the very exceptional character of these instances; indeed, in the same paper he records three others in which death followed the spontaneous rupture of the cyst at or before the seventh month of pregnancy, together with five cases in which tapping was performed during pregnancy —in one three times, one twice, and three once; in all these great relief was obtained, no evil resulted either to mother or child, and in all the children were born alive with moderate labors. He adds, accordingly, that "there is no proof that tapping an ovarian cyst is more dangerous during pregnancy than at any other time, and it will generally afford immediate relief to distension at a very slight risk to the mother, and lead to the natural termination of pregnancy in the birth of a living child, if proper precautions be taken to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air into this cavity and into the cavity of the cyst."

In another valuable paper on this subject Dr. Playfair has collected together the details of 57 cases in which an ovarian tumor was pushed down into the pelvis in front of the presenting part of the child, and so caused an obstruction to its passage. The results of the various methods of treatment adopted in these 57 cases are very instructive, and are given in a table on the next page, which I take from Dr. Playfair's paper above alluded to in the ninth volume of the *Obstetrical Transactions.* Of the total number of cases, 57, the position of the tumor was as follows: in 4 cases it was on the right side of the pelvis, in 4 on the left, in 37 it was in the recto-vaginal pouch, and in the rest its locality was not specified.

Various methods of *Treatment* have been practiced in these cases. When seen early in labor and correctly diagnosed, the tumor may sometimes, if the size admits of it, be forced up above the pelvic brim, where it should be kept until the head of the child occupies its place, in which case the labor may terminate without further hindrance. When this cannot be done, the size and nature of the tumor will to some extent determine the proper treatment; if it be small, and can be pushed to one side, the forceps may perhaps be successfully applied, or turning may be had recourse to. If the tumor contains fluid, this may be drawn off with a trocar and canula introduced through the rectum or vagina, or abdominally; if it be solid, but small and accessible, it may be excised, and delivery afterwards be effected. But if none of these methods are practicable, owing perhaps to the large size of the mass, we must then either perform craniotomy, and get the child away as best we can, or we must resort to the Cæsarean section; this is preferable to attempting the removal of the tumor, which would probably fail, and at any rate would seriously endanger the mother's life, while there would be but feeble chances of saving the child. It should be remembered, moreover, that labor in these cases of ovarian tumor occasionally though very rarely terminates by the natural efforts, the tumor becoming softened and compressed by the fœtal head so as to admit of its escape.

Table showing the results to Mother and Children of the various methods of treatment employed in Fifty-seven cases of Labor complicated with Ovarian Tumors.

	No. of Cases.	Result to Mothers.		Result to Children.		
		Recover'd.	Died.	Alive.	Dead.	Doubtful.
Left to natural powers, . .	13	7	6	5	5	3
Puncture of tumor, . . .	9	9	...	6	3	...
Pushed above brim, . . .	5	5	...	3	1	2
Embryotomy, ...	15	8	7	...	15	...
Cyst ruptured spontaneously,	4	2	1 1?	. .	1	3
Turning, ...	5	1	4	1	4	...
Forceps, ...	2	1	1	1	1	...
Rupture of uterus, ...	2	...	2	...	2	...
Cæsarean section, ...	1	...	1	...	1	...
Premature labor, ...	1	1	...	1	...	...

Within the last five years I have met with four cases of ovarian tumors, all of which were treated differently, and the results are I think instructive. In one the tumor was diagnosed before pregnancy, and was in fact under treatment; it was about the size of a large hen's egg when pregnancy occurred; it was carefully watched during the whole period of utero-gestation by my friend Dr. Edmund Nash of Notting Hill, who frequently pushed the growth up above the pelvic brim so as to keep the cavity free when labor came on. This was perfectly successful; the patient went her full time, was delivered naturally of a living child, and some time after delivery not a trace of the tumor could be discovered.

In another case the tumor was the size of the gravid uterus at term and was rapidly increasing; the patient had arrived at about the fifth month of gestation. I advised and performed extirpation of the growth. Unfortunately the patient aborted on the 2d day after the operation, and sank rapidly from shock.

In a third case, which was very similar to the foregoing, except that the tumor was very much larger, I tapped one large cyst at the 7th month, and the labor was completed naturally at full term.

In the fourth case the tumor, which was the size of the gravid uterus at 8 months, was not discovered till after delivery, the labor being natural though tedious; three days afterwards vomiting came on and continued incessantly till the patient sank on the 8th day, and on post-mortem examination it was discovered that the tumor only was in a state of intense inflammation, in some parts, indeed, it was almost in a gangrenous condition, and had evidently been the cause of death; for both uterus and peritoneum were found to be perfectly normal.

The practical teaching of these four cases seems to me to be this: if the tumor is small and can be pushed out of the way, do so; if there be one large cyst that can be emptied it should be done. If, as in case three, the tumor is multilocular and is rapidly increasing and seems likely to give rise to difficulties in labor it should be removed; and lastly, to leave such a case alone involves very great risk, as is seen in case four. Removal during pregnancy has certainly been performed successfully in a majority of the cases in which it has been done.

Polypi, or other uterine growths, are occasionally met with attached to some part of the os or cervix. They may be known by being pear-shaped and pedunculate, by being situate within the vagina, generally attached to the cervix uteri by a pedicle which can mostly be felt.

The simplest, easiest, and safest *Treatment* is to remove the tumor, either by torsion, if not too large, as in the case of nasal polypi, or by the application of a ligature round the pedicle, and afterwards dividing it with a pair of scissors, or, which is the best method, the tumor may be removed at once with the écraseur or scissors, as these growths have generally little vascularity and there is no fear of hæmorrhage unless the pedicle be of large size. The labor may then terminate naturally.

Scirrhous glands Dr. Ramsbotham mentioned as an occasional cause of tedious labor. They are situate along the hollow of the sacrum, and may be known, according to this authority, by the following characters: "Their situation, irregularity, and hardness;

by their being very sensitive; by their forming a chain of indurated tubercles, external to the vaginal coats; and by their being more or less firmly attached to the surrounding structures."

In regard to *Treatment*, it is obvious that nothing can be done in the way of removal, unless the growths can be pushed aside, which could probably be done with little difficulty.

The same authority mentioned *Abscesses* as being sometimes met with as an obstruction to labor. They are recognized by their excessive tenderness, by the existence of fluctuation, and by a history of previous pelvic inflammation and suppuration.

The proper *Treatment* is to evacuate the matter.

Stone in the bladder may prove a formidable obstacle to the passage of the child's head. It is readily detected by its situation, its hardness, and by the use of the bladder sound; it might be mistaken for a bony exostosis or an enchondroma of the pelvic wall, but the diagnosis may easily be made out by sounding the bladder.

Treatment.—If the stone be too large or too firmly wedged down in the pelvis to admit of its being pushed above the brim out of the way of the child's head, then one of two things may be done: either the stone must be removed by vaginal lithotomy, or else craniotomy must be performed. The latter has been resorted to several times, but there can be no question as to the advisability of the former proceeding. The cases in which this has been done have usually terminated satisfactorily. Of course, if the stone be detected before labor has far advanced, we should try to press it up above the pelvic brim, and keep it there till the head has engaged the pelvis, at the same time we must be very careful not to put the stone in a position where it is likely to subject the soft parts to severe pressure, for the result may be sloughing and the formation of a vesico-vaginal fistula.

Descent of the bladder, though hardly a tumor in the proper sense of the word, may, if distended with urine, present the same characters, though it will not generally occasion much difficulty or trouble. The longer it remains unrelieved the worse it becomes, for the descent of the head renders its evacuation more difficult, while more urine flowing into it constantly augments its size. It is an accident which will seldom happen if proper precautions are taken during labor to keep the organ empty.

The *Symptoms* are, constant desire to micturate, with inability to do so, a very painful sense of fulness, dragging, and stretching behind the pubis. The finger detects, on examination, a soft fluctuating tumor, situated in front of the cervix, and sometimes occupying the whole vagina. If allowed to go too long unrelieved, rupture may take place.

The *Treatment* is simple and easy enough ; a catheter should be introduced, and the urine drawn off, when the tumor will immediately disappear.

Fecal accumulation in the rectum is much more common as a cause of lingering labor than the accumulation in the bladder, especially among poor people. It is a condition easily recognized even by vaginal examination, but may readily be verified by examination *per anum.*

The *Treatment* consists in removing the obstruction, either by warm water injection, or if that fails, as it does sometimes, when the mass has been some time accumulating, and has become very hard, by scooping it out with a scoop, or spatula, or common spoon.

Dr. Churchill mentions the descent of a loop of intestine loaded with fæces into the cul-de-sac behind the uterus, forming a *vaginal hernia*, as a cause of delay in labor. It should be pressed up, if possible, above the pelvic brim, but if that cannot be done, and labor is retarded, the forceps should at once be applied, rather than allow any continued pressure on the intestine.

Thus far we have considered the principal abnormal conditions of the soft parts, which may give rise to unnatural labor. Those which belong to the pelvis may now be studied. I have thought it best to describe, under the head of pelvic tumors, those outgrowths from the bony walls which might perhaps strictly belong to this division, but it seemed better to consider the subject of pelvic tumors as a whole, and to take in one view every form of tumor which might present itself to the obstetrician. It only remains, therefore, now to describe the various

DEFORMITIES OF THE PELVIS.

These are of different kinds, may arise from several causes, and be attended with various results. In early life, rickets; in adult life, mollities ossium, may occasion pelvic distortion. Bony growths, as I have already described, and fractures of the pelvis are also causes of deformity.

It will be remembered that a normal pelvis measures at the brim in the antero-posterior or conjugate diameter, 4¼ inches; in the transverse, 5¼ inches; and in the oblique, 4¾ inches.

The deviations from this normal condition may affect the whole pelvis (in which case it is spoken of as *general*), or be confined to one part of it (*special*, or *partial*, deformity). Under the former head we may have either a very large roomy pelvis, the dimensions being increased equally in all directions; or we may have a small pelvis, the brim, cavity, and outlet being equally contracted, but still retaining the same relative proportions. The former is called the *pelvis equaliter justo major;* the latter, *pelvis equaliter justo minor*. This last is a deformity of very rare occurrence. The reader will observe that, strictly speaking, the term pelvic deformity is, in one sense, misapplied in both these two cases, for as the proper relative proportion of the several diameters is maintained in them, there is no room for the application of the word deformity, but in obstetric phraseology the term is applied to all deviations of whatever kind from the normal pelvic standard as given above.

Partial or special deviations are much more common: they may affect either the brim, the cavity, or the outlet, or all of them together.

Deformities in the brim are most frequently caused by the promontory of the sacrum projecting forwards and narrowing the inlet.

Deformities of the cavity by the sacrum being too straight or too curved, or by the spines of the ischia projecting forwards.

Deformities of the outlet either by too close approximation of the tuber ischii, or by the bones of the coccyx being ossified to one another.

The former of these three varieties is the more common deviation, and is caused by the weight of the body being transmitted through the spinal column and pushing forward the sacrum; the bones being at the same time softened as in rickets. With this condition the lateral diameter is usually increased. There are, however, other deformities of the pelvic brim, which are sometimes associated with this; thus, the symphysis pubis may be flattened and pushed towards the sacrum, or be driven forwards, so as to make the opening more or less kidney-bean or heart-shaped. Still more rarely, as M. Naegele has pointed out, the symphysis pubis is pushed to one side, the sacrum to the opposite side, the pelvis is flattened on one side, bulging on the other; the oblique diameter on one side is shorter, that on the other longer, than natural; this applies to the entire pelvis, which is thus, as it were, awry, and to it he gave the term of the *obliquely distorted pelvis.*

Another very rare form of pelvic distortion is the *funnel-shaped pelvis;* in this case the brim is of normal shape and size, but the cavity and outlet are gradually contracted in all diameters downwards to the inferior aperture.

It will thus be seen that there are five principal varieties of pelvic deformity, or abnormality: 1. *The small pelvis.* 2. *The large pelvis:* the several diameters in each of these varieties maintaining their proper relative proportions, but being all represented by a plus or minus quantity. 3. *The partially deformed pelvis,* in which either the brim, cavity, or outlet is affected. 4. *The obliquely distorted pelvis.* 5. *The funnel-shaped pelvis.*

Professor Naegele gives the following characters as frequently indicative of, or at all events associated with, deformed pelvis; it will be seen that they are mostly the result of rickets in early life—the lower jaw projecting beyond the upper; the chin very prominent; the teeth grooved transversely; unhealthy appearance; pale ashy color of the face; diminutive stature; unsteady gait; when the woman walks the chest is held back, the abdomen projects, and the arms hang behind; there is deformity of the spine and breast; one hip higher than the other; the joints of the hands and feet are remarkably thick; curvature of the extremities, especially the inferior, even without distortion of the spine, is a very important sign; wherever the lower extremities are curved, the pelvis is mostly deformed. It is well to ascertain also if, when a child, it was a long time before she could walk alone; whether she had any fall on the sacrum; whether, as a girl, she was made to carry heavy weights, or to work in manufactories.

It is of the utmost importance to be able to *Diagnose* pelvic distortion. If the top of the sacrum can be reached easily with the finger there is probably coarctation of the brim; its absence, however, is no proof of the contrary. If seen during labor, the fœtal head must be compared with the pelvis, or with that part of it where it seems to be arrested.

Dr. Rigby stated, in reference to deformity at the brim, that "besides the general appearance of the patient, we frequently find that the uterine contractions are very irregular; that they have but little effect in dilating the os uteri; the head does not descend against it, but remains high up; it shows no disposition to enter the pelvic cavity, and rests upon the symphysis pubis, against which it presses very firmly, being pushed forwards by the promontory of the sacrum." In this case, as I have said, the distortion is supposed to be at the brim, but it may also extend to the cavity, or it may exist here, while the brim remains normal, in which case the head may enter the cavity and there be fixed, neither descending with the pains nor receding in the interval. Or lastly, the deformity may be limited to the outlet; in this case the head having descended thus far, may be arrested in its exit, either by narrowing of the subpubic arch, or by anchylosis of the coccyx, or by approximation of the tuberosities of the ischia, or by the coexistence of these three conditions, as in the funnel-shaped pelvis.

No fixed rule can be given as to the *Treatment* necessary for the different forms of pelvic distortion, for in one the natural efforts may effect much more than in another; in one the child's head may be smaller than usual, in another larger; in one the fœtal bones may be abnormally ossified, in another less than usual, and may overlap to a greater extent than is common: hence the rule, always to wait until the natural efforts have been fairly tried. If the head enters the pelvis, but is unable to proceed, the forceps may possibly effect extraction. If the pelvic distortion be such that the head cannot engage the brim, but remains entirely above, the forceps will be found inapplicable, for if applied to the head there will not be space enough for their extraction, nor would the head bear the necessary amount of compression. In such a case possibly turning might, as the late Sir James Simpson and Dr. Tyler Smith have shown, accomplish delivery. These observers have made out that the fœtal skull represents on section somewhat of a wedge-shape, the narrow part of which is at the base, the vertex being the broadest part; hence it was supposed that by turning the child, and bringing down first the thin end of the wedge (the base of the skull), probably the rest of the wedge might be pulled through. In very many instances such is really the case, and where this fails, there is no choice but to perform craniotomy. Lastly, where the distortion is so great that even this cannot be accomplished with success, the Cæsarean section must be performed.

As a general rule, it may be stated that the case is a fit one for the application of the forceps if there be a conjugate diameter of from 3¼ to 4 inches; if less than 3¼ inches the forceps will be unsuccessful, but between that measurement and a conjugate diameter of 2½ inches the operation of turning will probably succeed: if there be less than 2½ inches but more than 1¾, then craniotomy must be resorted to, but to perform this operation with any reasonable hope of success as regards the mother, there ought to be a clear available space of at least 1¾ inches; if the conjugate be less than that, then a mutilated child cannot with safety to the mother be extracted, and the Cæsarean section is our only choice. Some have thought that 2 inches is the narrowest through which a mutilated child can be extracted, while others have fixed 1 inch at the lowest. Obviously, if in cases of pelvic deformity, using that word in its obstetric sense, we could always secure an examination before the full term of utero-gestation, the terrible operations of the Cæsarean section and craniotomy might be altogether abolished by the timely induction of premature labor, and in this case the operations required by the several degrees of pelvic deformity would vary according to the term of gestation and the relative size of the fœtal head. Thus, supposing a conjugate diameter of from 3¼ to 4 inches, labor may be completed at the seventh month with no other operation than is necessary for its induction: if the conjugate be not less than 3¼ inches, then the forceps will be applicable at the same period; from 3¼ to 1¾ inches, turning will probably succeed at the seventh month; but if the diameter be less than 1¾ inches nothing short of craniotomy will suffice even at this early period of gestation.

In cases of pelvic deformity it is difficult, if not impossible, to give any idea of the time at which operative interference may become necessary; we should at least wait until the os uteri is pretty well dilated, or soft and dilatable; but that being accomplished, if it be clear how great the distortion is, the rules just given should at once be acted upon, and delivery be effected in one or other way. There is no use, but on the contrary great danger, in waiting till symptoms either of exhaustion or of powerless labor have set in.

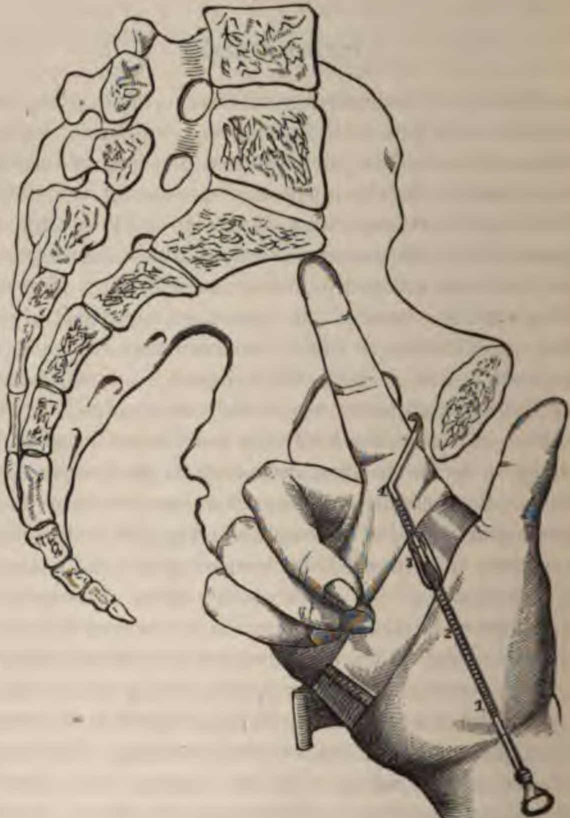
The present seems a fitting opportunity for making a few remarks on the subject of

PELVIMETERS.

The difficulty of determining whether and to what extent a pelvis is deformed, has at all times been a subject of serious consideration, and has led to the invention of numerous instruments called pelvimeters, for the purpose of estimating such deformity. The French obstetricians have been especially prolific in this department, but in this country there has always been a preference for that most natural, and in many respects most convenient of all pelvimeters, the hand of the operator; any artificial method, therefore, would seem to have the best chance of success, with British practitioners at least, which depended more upon the examining fingers than upon any merely mechanical contrivance, and in this respect undoubtedly the pelvimeter invented by Dr. Greenhalgh is by far the best, the simplest, most easily used, and probably most trustworthy of any that has yet been described. This instrument, which is represented in Fig. 130, is thus described by the author: it is intended for measuring internally the antero-posterior diameter of the pelvis at the brim. The principle of the instrument is to assist the finger in measuring this diameter. It consists of a band of flexible metal one inch broad, which forms a ring. This band encircles the hand, passing across the centre of the palm, the size of the ring being adapted to different sized hands by a piece of elastic india-rubber webbing. On the surface of the band corresponding with the centre of the palm of the hand, is a projecting pivot perforated so as to allow a small metal rod to traverse it. The rod is 7½ inches long, graduated along its central third; at its distal extremity it is bent at right angles into a form which admits of its sliding along the index or examining finger.

It is to be used thus: The right hand having the instrument fitted to it, the forefinger or two first fingers are to be introduced so as to reach the sacral promontory. The curved extremity of the rod lies now on the radial side of the index finger. The promontory having been reached, the rod is drawn outwards until the ring-shaped extremity is arrested against the arch of the pubis. The hand is then withdrawn, care being taken to note the distance

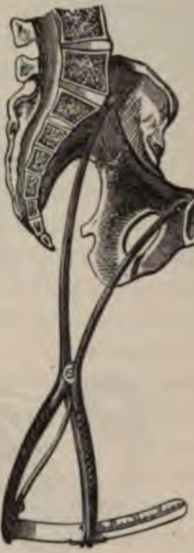
FIG. 130.



at which the rod is thus stopped, as shown on the index, and when the hand is withdrawn the antero-posterior diameter of the pelvis can be obtained by measuring the length between the end of the finger and the extremity of the rod.

In the pelvimeter invented by the late Dr. Earle of Birmingham, described in the third volume of the *Obstetrical Transactions*, we have another instrument, in which the fingers are represented by two steel blades; in this respect, therefore, it is inferior to the one just described, because both fingers are here, as it were, represented by proxy, and in this matter, at all events, a proxy is not so good as the principal. It consists of a pair of curved blades, so placed that when not in use the one lies in the concavity of the other. Each arm measures about 7 inches, and the handles are so arranged that by pressing them together the arms just described are separated while the instrument is closed by a spring fixed between the handles. A scale graduated in inches is attached to the near end of one of the handles, and passes through a slit in the corresponding part of the other handle. This scale is provided with a sliding self-registering index, which thus marks the distance to which the distal extremities of the instrument are separated when in use. The annexed drawing (Fig. 131) shows these several points, and it will be allowed, I think, that the instrument is a very convenient one. It appears, moreover, that the same idea had occurred to several inventors, Drs. Harris and Murphy having both introduced somewhat similar instruments, while the former afterwards adopted one or two of the best features in Dr. Earle's instrument, thus confirming the advantages which the latter claimed for it.

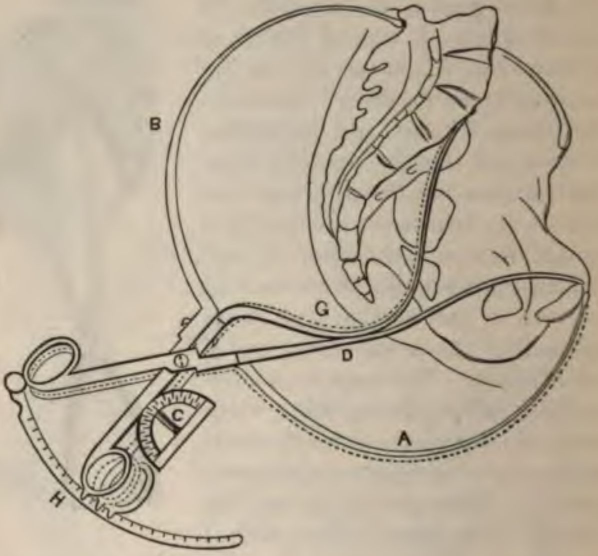
FIG. 131.



In using the instrument it is to be introduced closed into the vagina, the patient lying on her left side; the ends are placed behind the pubis, and the blades are then opened by approximating the handles until the posterior one touches the promontory of the sacrum, to which point it must be guided by the examining finger of the operator: as soon as the posterior blade has touched the sacral promontory the instrument is to be closed and withdrawn; the indicator at the end of the handle then shows to what extent the blades have separated, and consequently the diameter of the pelvic brim.

Another most ingenious form of pelvimeter is that which is figured in the annexed sketch, Fig. 132. It is the invention of my friend Prof. Lazarewitch, of Charkoff, Russia, and for the following description I am indebted to the *Catalogue of Obstetrical Instruments*, already referred to. It is a universal pelvimeter, adapt-

FIG. 132.



ed for the external measurement, the internal measurement, or the external and internal combined measurements of the pelvis.

"It consists of a handle like those of a pair of scissors, measuring 8 inches in length, 4½ as far as the pivot joint. This handle has a curved scale (H) attached to one ring, and traversing the other. The scale folds up when not in use. When used for external measurement, two arms, each a slender steel semicircular rod (A and B) are attached to the handles, and then fixed by a simple contrivance. As thus used, the instrument gives the external measurement of the pelvis in any required direction.

"For external measurement two other arms are used (C and D). The arm C has a double curve, the arm D is nearly, but not quite straight. From the pivot to the extremity, each measures in a straight line 9½ inches. The arm C is intended to be applied to the sacral promontory, the arm D to the interior of the pubic symphysis. The arm D can be bifurcated 2⅝ inches from its e tremity (at E). When the handles of the instrument are together, the arms C and D are in apposition at their extremities, the curve of the anterior blade fitting into that of the posterior, and they are so introduced. In separating the handles, the blades C and D cross, and the curve of the arms is such that the projection of the perineum is allowed for, and does not interfere with the proper application of the two arms to the brim of the pubis and sacrum respectively. The internal separation of the arms is shown in the scale attached at the handles, and the internal antero-posterior diameter of the brim or other parts of the pelvis is thus obtained. The arm A is graduated on its outer side for measuring the vertical height of the sacrum; and also for measuring the height of the pubic symphysis. The distance from the sacral promontory to the *external* surface of the pubic symphysis is obtainable by using simultaneously the arms C and D.

"Lastly, the instrument is provided with an apparatus for determining the antero-posterior internal measurement of the pelvis at different situations, *e. g.*, at the centre of the sacrum, or at the outlet or any intermediate point. The convex border of a semicircular scale is attached to the handle at its side. An index suspended from a cross-bar parallel to the handle indicates in the accurately divided semicircular scale the angle of inclination to the margin of the handle, and consequently (the patient lying flat on the back) of the line which is being measured internally at the same moment. In taking observations by this method, the arms C and D are used. Within this semicircular scale, F, is suspended another and smaller one, G, at right angles to it, for the purpose of determining the angular direction of any measurement made when the arms were engaged in measuring from side to side of the pelvis internally. The mechanism of this part of the instrument is of great delicacy. It can be readily detached from the handle when the pelvimeter is in use for ordinary purposes."

These, then, are the best instruments in my judgement which have yet been invented for the measurement of the pelvis; but they are none of them perfect, nor possibly can such an instrument be devised. Unfortunately, too, it is in the cases of slighter deformity that the greatest difficulty of diagnosis will be found, yet here it is of the greatest moment, because an error of judgment may lead to disastrous consequences as regards the life of the child. On the whole, I must confess that I am still inclined to trust more to my own hand than to any mechanical appliance.

If the hand alone is employed there are two or three ways of using it; the first is to touch, or try to touch, the promontory of the sacrum with the tip of the forefinger, and then estimate the space from that to the under part of the symphysis pubis, which will, of course, be in contact with the upper part of the examining finger. This gives but an approximate idea of the true diameter at the top of the pubis, and in cases of slight distortion it is practically useless, inasmuch as the finger will probably not be long enough to reach the sacral promontory at all. The second mode is to introduce the entire hand into the pelvis, and place the fingers in a line across the antero-posterior diameter. If there be more or less room than is required for that purpose, the fingers may be separated or folded over each other, and some idea will thus be formed of the conjugate diameter. This, it must be confessed, is a very clumsy mode of procedure; it is also by no means an easy method either to the patient or the practitioner; to the former, indeed, it is extremely painful, and it is proportionately difficult to the attendant, while the results are certainly not very trustworthy. The third mode is to introduce the first two fingers into the vagina and up to the pelvic brim, and placing the forefinger against the pubis, separate them so as to touch the sacral promontory with the back part of the second finger. For this purpose I think the left hand will be found most convenient. The degree to which the fingers separate will tell us of the intervening space. One great advantage of this is its applicability to cases where the head has to some extent engaged the pelvic brim. Neither of the other methods, except that of Dr. Greenhalgh, could be resorted to in such a case.

Of course, as I have before said, a pelvis much deformed is easier of diagnosis than one less so, and hence negative evidence is to a certain extent rather favorable than otherwise.

CHAPTER III.

UNNATURAL LABOR FROM ABNORMAL CONDITIONS OF THE CHILD.

Having now considered two of the principal causes of unnatural labor—those, namely, dependent upon—1, abnormal conditions of the expelling power; and, 2, abnormal conditions of the passages—I pass on, lastly, to consider those deviations from natural labor which arise from *abnormal conditions of the child.* Under this head will be discussed, in the order indicated—1. Morbid conditions of the fœtal envelopes; 2. Deformities and monstrosities of the child; 3. Plural births; and 4. Malpresentations.

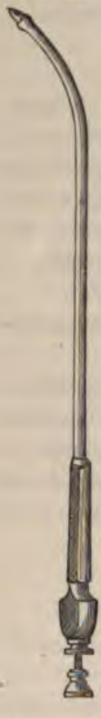
It will, perhaps, be thought that I have grouped together subjects which are very heterogeneous, but it seems to me not altogether an unnatural arrangement, and it will, I hope, be advantageous to the student, for whose special convenience I have adopted it, in the hope of thereby facilitating his study of this very practical department of obstetrics.

I. MORBID CONDITIONS OF THE FŒTAL ENVELOPES.

Toughness of the membranes is occasionally a cause of delay in the progress of labor, though this can only occur after the full dilatation of the os, for it is always desirable that the membranes should remain entire until after the completion of that stage; but when once this is accomplished and the membranes are beginning to show at the external parts, it is clear that they have done all as regards the labor for which they are intended, and the sooner they are ruptured the better. It is, indeed, one of the first axioms to be learned in obstetric practice, not officiously or unnecessarily to destroy the cyst which the membranes with their fluid contents represent, so long as any advantage can be gained by its dilating power. It is very commonly supposed that the condition I am considering is usually associated with an excessive secretion of liquor amnii. It may be so sometimes, but it certainly is not always, for I have met with several cases in which the one existed in the most marked degree without any evidence of the other.

The *Treatment* is simple enough, namely, to rupture the membranes. This may be done either by pressure of the finger during a pain; or by scratching them with the finger-nail; or, if these means fail, we may pierce them with a knitting or hair-pin or other instrument. In the annexed illustration (Fig. 133) is represented an instrument specially invented for this purpose; it is the membrane perforator of Dr. Lee. At the end of the handle there is a button, which by slight pressure projects the sharp perforating point at the other end. This is again withdrawn into the sheath by the spring which is connected with the button, so that when it is introduced, the sharp point is sheathed until the instrument touches the membranes, then by slight pressure on the handle the point is projected, and the puncture effected. In using any sharp-pointed instrument of the kind mentioned, great care should be taken in passing it up to the tense membranes during a pain, to guard the point against injuring the soft parts, either maternal or fœtal; this we can easily do by pressing the point a little into the fleshy end of the first or examining finger, and so carry it up to the protruding membranes, where it may be as it were uncovered and thrust quickly forwards. Another caution necessary to be observed is, not to pass it too far, lest we injure the presenting part of the child: the escape of fluid will tell us when our object is accomplished. We ought always, however, before resorting to this step, to be quite sure that delivery is being delayed by this condition, and should never puncture except when the os is fully dilated, for

Fig. 133.



Premature rupture of the membranes, that is, rupture before the os is fully dilated, whether done by the natural efforts or by the accoucheur, is pretty certain to retard labor, from the want of that soft dilating "bag" which they form when entire. This accident also greatly increases the suffering of labor, from the pressure occasioned by the hard unyielding head upon the os. There is, of course, nothing to be done by way of *treatment*, for we cannot repair the mischief which has been done.

Excess of liquor amnii is a much more certain cause of tardy labor than either of the two foregoing. The normal quantity of this fluid at full time is stated to be about eight ounces, but cases have been recorded in which there was double that number of pints. Much discussion has arisen as to the probable source of this fluid, when present in such large quantities: some have thought that it was due to an inflammatory condition of the amnion; while from its very frequent association with diseases of the fœtus, others have thought it in some way connected with that as a cause. I know of one lady who in seven successive pregnancies has had enormous accumulations of liquor amnii; and there has also always been disease of the fœtus in the shape of general dropsy, especially in its serous cavities; premature labor has been induced in this case on several occasions for the purpose, if possible, of arresting this disease, of preventing this enormous accumulation, and so of saving the life of the child.

The *Symptoms* of this condition are—an unusual size of the uterus, and a more than ordinarily globular shape, exceedingly distinct fluctuation, feeble fœtal movements, pains about the uterus and loins, and, from pressure, occasional dropsy of the lower extremities.

The cause of the delay in labor is the inability on the part of the uterus to contract properly, in consequence of the great distension to which it is subjected: and we may generally suspect its existence during labor if we find that the os is well dilated, but labor does not advance, while the head remains high up both during and after the pains: always supposing that there be no serious pelvic deformity to account for the delay.

The *Treatment* to be adopted is, as soon as the os is well dilated, or at any rate is soft and dilatable, and provided the presentation is natural, to puncture the membranes, and thus allow the uterus a better chance after the evacuation of the fluid of contracting upon the child, which it speedily does. Labor will generally be completed soon after, unless some further obstruction arises from dropsy in the child.

II. FŒTAL DEFORMITY (MONSTROSITY).

Under this head are included all deviations from the normal and healthy development of the parts belonging to the child, whether they are the result of disease, or are abnormal growths independent, so to say, of special diseased action. These deviations need not necessarily retard labor—on the contrary, the developmental process may have been so far arrested, in some part important in the process of parturition, that the child offers a less degree of resistance than usual, and consequently the labor is rather expedited than otherwise. On the other hand, the existence of a tumor, or the accumulation of fluid in some of the serous cavities, may be such as not only to retard the labor, but to necessitate the destruction of the child. Delivery may also be impeded by a general excess in the development of the child, or by an unusual degree of ossification, and a consequent want of compressibility in the cranial bones without any real increase in the size of the head. Usually, however, these cases do not occasion any serious obstacle, though they may give rise to some delay; for though the first stage will most probably be very prolonged, delivery will most frequently be accomplished by the natural efforts. If, however, the patient's strength is beginning to suffer, and the head makes no descent, the forceps may be applied; should they fail to effect sufficient compression, turning should then be tried; and should this also fail, the perforator must be used.

It is impossible to give any definite rules with regard to the *Treatment* of monstrosities, because of their almost infinite variety; each case must be studied by itself, and be treated according to general principles. They are often most difficult of diagnosis, and an opinion can sometimes only be formed from negative evidence. One not uncommon form of monster is where two or more children, or parts of children, are joined together in some part of their bodies—as, for instance, in the case of the Siamese twins. The union may be either by the abdomen, the side, or the back, or more rarely by the head. I have in my possession a photograph of two children who were joined together at the top of the head, end to end as it were. Other forms of monstrosity exist where parts of the child are in duplicate. Thus we may have double sets of the upper or lower extremities, two heads, etc. In short, the variety is almost endless.

The *Deformities resulting from disease*, and which are or may be a cause of delay in effecting [illegible], are hydrocephalus, hydrothorax, ascites, and cere [illegible] siderably in extent. [illegible] the skull are usual [illegible] semble a membranous bag, and if there be abundance of uterine action this bag may be squeezed through the pelvis, and delivery be accomplished without further interference; this result, however, is extremely rare. In some cases rupture of the head has taken place, the fluid escaping, and delivery speedily following. Generally, this condition is easily recognized, if the disease be at all well marked, but in slight cases there is much greater difficulty in diagnosis; ordinarily there is an absence of the usual degree of hardness in the cranial bones, the presenting part is soft, elastic, and tense, in some cases almost resembling a breech; the sutures and fontanelles are wide apart, and may not be distinguishable at all; the bones are loose, and despite the normal dimensions of the pelvis and powerful uterine contractions, no descent of the head beyond the pelvic brim takes place.

In regard to *Treatment*, if the disease exists only to a very slight extent, the unusually yielding character of the cranial bones may perhaps suffice to admit of natural delivery; but if not, if the fluid accumulation be extensive, then tapping or perforation must be resorted to; and inasmuch as the disease itself is pretty certain to end fatally sooner or later, we need not hesitate long in the course recommended, especially as delay is sure to be detrimental to the mother, for the maternal structures are so bruised by the jamming down of the head into the pelvis that inflammation and even sloughing may soon set in with their attendant results, in the formation of vesico-vaginal or recto-vaginal fistulas. Nay, more, rupture of the uterus may occur when the uterine action is strong and the resistance great. Out of seventy cases this occurred no less than sixteen times. Sir James Simpson suggested that in these cases of hydrocephalus instead of the perforator we should use a small trocar with which to draw off the fluid, in the hope that this may suffice to accomplish delivery, and that the child may subsequently have a chance of recovery. The suggestion is, I think, well worthy of trial.

In *Ascites* and *Hydrothorax*, the latter being much the rarer of the two conditions, there is generally less difficulty in the diagnosis, for if the head has come down, and the chest or abdomen still refuse to enter the pelvis, there can be little doubt as to the cause of the delay.

The causes of dropsical effusion are not very well known; they are, probably, various. In some cases of ascites or hydrothorax, there is reason to suppose that the effusion is the product of inflammation, either in the peritoneum or pleura; and Sir James Simpson showed that peritonitis is a much more common occurrence during intrauterine life than was supposed. In the case of hydrocephalus, the condition is probably precisely the same as in chronic hydrocephalus, after birth, and due to the same cause; but in those cases where there is also great accumulation of liquor amnii, it seems not unlikely that the dropsical condition is due to some morbid process occurring in the placenta, most likely of an inflammatory nature, and probably dates from a very early period of fœtal life. Constitutional syphilis is also a disease which is likely to lead to conditions of this kind.

The *treatment* of these conditions is very much the same as for hydrocephalus: reasonable time should be given for the natural efforts, and if tapping be required, provided the case be one not necessarily fatal for any cranial complication, it ought always to be performed with a small trocar in preference to the perforator, because, as we know, neither ascites nor hydrothorax are necessarily fatal conditions. Depaul has pointed out that a greatly distended urinary bladder may be mistaken for ascites. I know of no means by which to distinguish these two, nor does the treatment differ materially, for in the latter condition, as in the former, relief is to be sought by puncturing the bladder with a small trocar, and in all such cases where this expedient is necessary the fluid evacuated should be carefully examined, for there is no other means by which to determine the exact nature of the case.

III. PLURAL BIRTHS.

The frequency of plural births given by Dr. Churchill is as follows: In this country twins occur about once in 76½ cases, and triplets once in 6000 cases; in France twins once in 108 cases, triplets once in 6568 cases; in Germany twins once in 81½ cases, and triplets once in 8454; so that plural births are much more frequent in this than any other country. This is a remarkable occurrence, and is thought to be due to the greater virile power of the English as a nation. In such a matter, however, it is obviously on the female side that plural gestation occurs, for it can only result from the fertilization of two or more ova, and for this purpose, probably, not more of the sperm fluid is necessary than would be emitted in an ordinary act of sexual intercourse. It is further remarkable that in Ireland the number of plural births is greatly in excess of that of any other country. This disposition to multiple gestation appears in some cases to be hereditary, and it often occurs several times in the same woman. Some seasons also appear to be more prolific than others. Of course the occurrence of plural gestation is, as I have said, due to the fertilization of two or more ova, which may have come from one ovary, or from both.

The maternal mortality in plural births is given as 1 in 20: the fœtal, 1 in 4 in the case of twins, and 1 in 3 in the case of triplets.

Twin males are more common than twin females, but a mixture of the sexes is more frequent than otherwise, and there appears to be more danger to the boys than to the girls, especially where there are twin cases of opposite sexes. As a rule, plural births, and especially twin cases, are very tedious; one principal reason for this being the great distension of the uterus, and its consequent inability to contract with vigor upon its contents.

The first child may present naturally or otherwise, but the second presentation will generally be the reverse of the first. The general management of these cases is conducted in the same manner as for similar presentations in single cases. Each child is enveloped in its own bag, and each has its separate cord and placenta, though the latter are generally so closely united that they often appear as one large one. In all cases, however, the two circulations are distinct throughout.

If the case has not been previously diagnosed, it will readily be detected after the birth of the first child, by placing the hand over the abdomen; having discovered that a second child is there, the presentation should then be noted. The second delivery will, of course, occupy a shorter time than the first, and it may be much facilitated by applying a bandage firmly over the body as soon as the first child is born: this gives great support, and enables the uterus to contract more firmly and forcibly.

Occasionally in these cases hæmorrhage follows the second birth in consequence of imperfect uterine action, the result either of previous over-distension, or of tedious and protracted labor, the uterus having become worn out, as it were; or it may arise from the sudden emptying of the organ, causing a sort of collapse.

Sometimes the delay after the first delivery is excessive, and "experience has shown that the second child is very likely to be stillborn, if left longer than two or three hours unassisted"

(Collins). If, therefore, no progress is made half an hour or so after the delivery of the first, and the membranes are still entire, they should be ruptured; if no uterine action follows, ergot may be given; if still no advance is made, the feet should be brought down, or if the head is low down, the forceps may be applied.

Where the second child presents with either of the upper extremities, it will be necessary at once to turn, before, if possible, the rupture of the membranes. There is usually but very little difficulty in this proceeding, owing to the previously dilated condition of the parts.

It need hardly be said that no attempt should be made to remove the placenta of the first child before the delivery of the second, as that is sure to excite hæmorrhage. We ought also to avoid any traction upon the cord, not only because we may thereby detach some portion of the placenta, and thus occasion hæmorrhage; but there is danger also lest the cord should entangle the other child and interfere with its circulation.

The same general rules which are here given apply equally, whether the fœtuses are both of them fully developed, or one is undeveloped, the other fully formed, as in the case of the so-called superfœtation, except that in the latter case there is seldom any need for artificial interference; the blighted one is that usually expelled last, and in its expulsion there is seldom or never any difficulty.

I have stated that, as a general rule, in cases of plural birth each child is contained in its own amnion; but it happens now and then that there is but one common amniotic cavity, the two original sacs having probably become one, and in such cases there is apt to be great difficulty and delay, owing to the parts of one child becoming entangled in those of the other. This may lead to a malpresentation and consequent delay. Thus, supposing that instead of presenting by the head, as is usual, the first child is either a breech or footling presentation, very probably, as it descends, just when the head is entering the pelvic brim, its chin may become lodged as it were on the chin of the other child. Dr. Barnes has admirably represented this complication, and he shows how it is that such a state of things may eventually require the performance of embryotomy, in order to extricate one of the children. Before resorting to this, however, we ought to endeavor to unlock the heads, as it were, by pushing up the presenting and perhaps partially born child, while at the same time by external manipulation we try to dislodge one of the heads, and to push it out of the way of the other in order that its further descent may not be interfered with. If we fail in this, as too often we shall, especially where the uterus is firmly contracted on its contents, the next resource is decapitation of the child which is partially born; the trunk should be pulled far back, so that the neck may be reached behind the pubis; as soon as this is severed the decapitated head will probably recede, and the second head will descend, or it may be hastened by the application of the forceps.

If the first child, as is usual, presents with the head and gets locked as before, the forceps may be applied to the presenting head, while the other head is pushed aside until the first child is born.

Of course we must not always conclude that after the birth of the second child all is over, and proceed to bandage the patient prior to leaving the house, for in plural cases the possibility of there being more than two, and even so many as four or five, must be remembered, and the practitioner should not feel satisfied until he is sure that the uterus is quite empty and is firmly contracted to the size of a fœtal head, as felt through the abdominal wall.

IV. MALPRESENTATIONS.

The only remaining complications to the progress of labor on the part of the child which have yet to be considered, are those in which some deviation from what has been called a natural presentation exists, that is to say, where some part of the child other than the head, or simultaneously with the head, presents at the pelvic brim. These malpresentations are very various, but they may be mostly classed under two principal divisions, 1, those in which some part of the upper, or, 2, those in which some part of the lower extremities presents. Occasionally, however, the presentation consists of part both of the upper and of the lower extremity.

Among malpresentations of the upper extremities may be classed also those of

V. FACE PRESENTATIONS.

There are four kinds of face presentation, corresponding with the four positions of head presentation, and are called respectively *first*, *second*, *third*, and *fourth* face presentation: the first is the more common of them all. According to Churchill, face presentations occur about once in every 230½ cases; but they seem to occur more frequently in German than in either French or British practice; thus in British practice, of 154,766 cases there were 590 face presentations, or 1 in 262; of 50,141 cases in French practice, there were 189 face presentations, or 1 in 265⅓; while in German practice, of 69,417 cases there were 411 face presentations, or 1 in 169½. This gives a total of 1190 cases of face presentation in 274,324 cases.

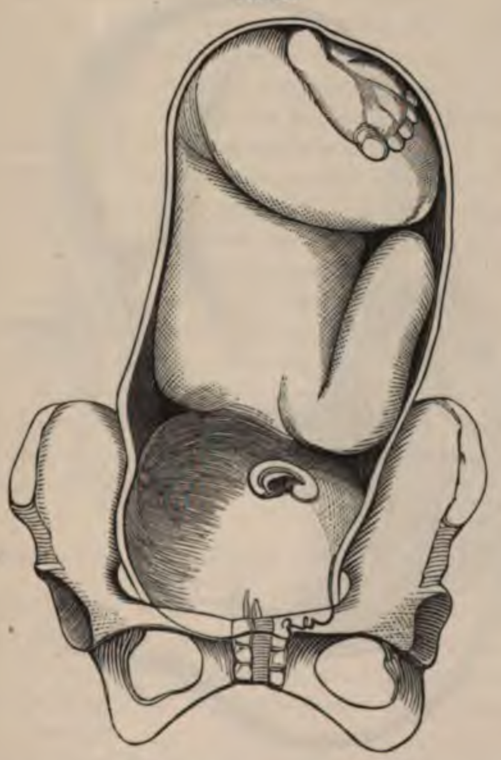
Cases of face presentation are not very fatal to the child if left alone, 19 only out of 256 being lost, and though occasionally very tedious, instrumental interference is by no means frequently necessary. "In this case I do not turn the head round in order to deliver, but nineteen times in twenty leave it to itself to come as it will" (Dr. W. Hunter's MS. Lectures). The same opinion is expressed, and the same practice adopted, by most English authorities.

It is more than probable that originally all face presentations are presentations of the head which "have been changed by the action of the uterus" (Ramsbotham); hence it is that "the right side of the face presents more frequently than the left, for if the head in the first cranial position moves round upon its transverse diameter, and thus allows the face to turn downwards, we shall immediately have a first position of the face" (Rigby); and, on the other hand, Dr. Merriman has "twice known the presentation of the face converted by the pains alone into a natural presentation."

The *Diagnosis* of a face presentation is generally pretty easy; that for which it is liable to be mistaken is the breech. In face cases, the bridge of the nose is found crossing the pelvis somewhat obliquely; this is the distinctive mark between the face and the nates; the position may be further estimated by observing to which side the soft extremity of the nose is directed, while on the opposite side the hard rounded contour of the forehead will be felt. We shall also be able to make out the malar bone and the eye. Generally the face does not look directly downwards, but one or other side is slightly depending, and to this the terms right and left, or first and second face presentation, are applied.

In the *first* or *right*, the chin, and the soft tip of the nose, are directed to the right sacro-iliac synchondrosis, and they gradually come more under the *right* half of the pubic arch as the head descends; the nose is found diagonally across the pelvis in the direction of the right oblique diameter, the forehead being near to the left obturator foramen, hence the right side of the face is most anterior; "the face during the whole process preserving a strictly oblique position, both as to the transverse diameter and axis of the pelvis" (Ibid.): consequently the *right* malar bone and eye are the parts first touched in examination, and the *right* cheek has the swelling upon it representing the caput succedaneum. As labor advances and the head descends, the lower part of the face, the chin and mouth, emerge under the pubic arch, while the top of the head sweeps into the hollow of the sacrum. A little later, the face presents at the external orifice, the chin being nearest the urethra: it soon sweeps round the subpubic arch, the head becoming slightly flexed as the vertex is

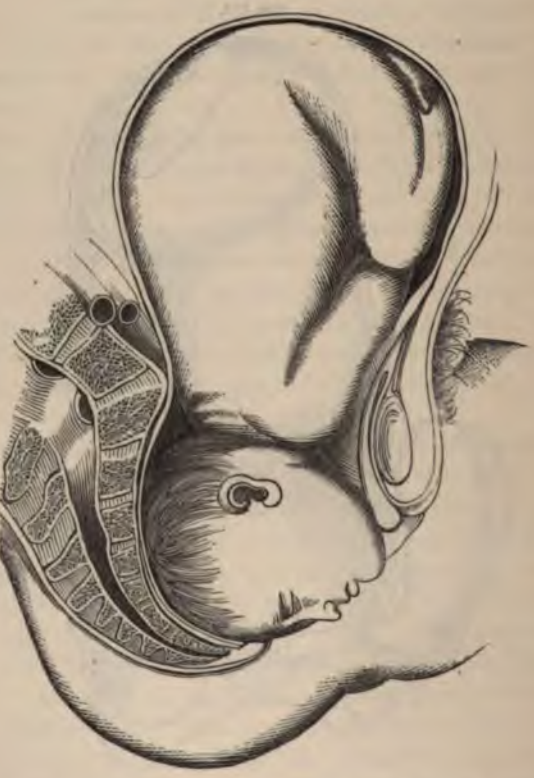
FIG. 134.



forced down and the occiput passes over the lower part of the sacrum and coccyx.

In the *second* or *left face presentation*, just the reverse obtains, as is seen in the preceding illustration, Fig. 134, which represents the head just engaging the pelvic brim; the nose still maintains its oblique position across the pelvis, but its tip and the forehead have changed places; the *left* cheek is most depending, and is that on which the swelling, if any, takes place; the *left* malar bone and eye are first felt on examination, and the chin turns under the *left* half of the pubic arch as it descends from this point, which is represented in Fig. 135; the further progress of the head is almost identical with that which has just been described. Thus it is seen that in the *first* or *right* face presentation

FIG. 135.



everything is on the right side, while in the *second* or *left* all is on that side.

In the *third* and *fourth* facial presentations the forehead is directed to the right and left sacro-iliac synchondrosis respectively, but their occurrence is of such extreme rarity that I need not here describe them more fully, as to understand the first and second presentations, is to understand them all.

As a general rule no *Treatment* is required in the management of face presentations; for beyond a somewhat protracted first stage, and a little more pain to the mother, these cases mostly do well. Sometimes, however, where delay is excessive, "the brain and vessels of the neck will be so much compressed and obstructed as to destroy the child" (*Smellie*). This is especially liable to occur where there is slight diminution of the pelvic diameters, or any disproportion between the child and the passages. In such cases, the progress of the face from its transverse or oblique direction towards the conjugate is apt to be arrested, as it were, half way, and then the application either of the forceps or the vectis will be the appropriate treatment. In applying the forceps we must remember this position of the face and head, and also that our object is to get the face down from one or other side in which it is arrested into the antero-posterior diameter; afterwards we must try by making traction forwards, and at the same time upwards, to rotate the head, as it were, upon its own transverse axis, so as to bring the chin out under the pubic arch, while the vertex is sweeping over the hollow of the sacrum and perineum. Where there is any difficulty in establishing respiration after birth, or any evidence of cerebral congestion, a little blood should be allowed to flow from the umbilical cord, and cold water should be dashed over the face.

PRESENTATIONS OF THE BREECH AND LOWER EXTREMITIES.

Under the head of breech or nates presentations, may be arranged also presentations of any portion of the lower extremity, "positions of the pelvic extremity of the child," as these are all but slight modifications of the former, and in their course present little or no variation.

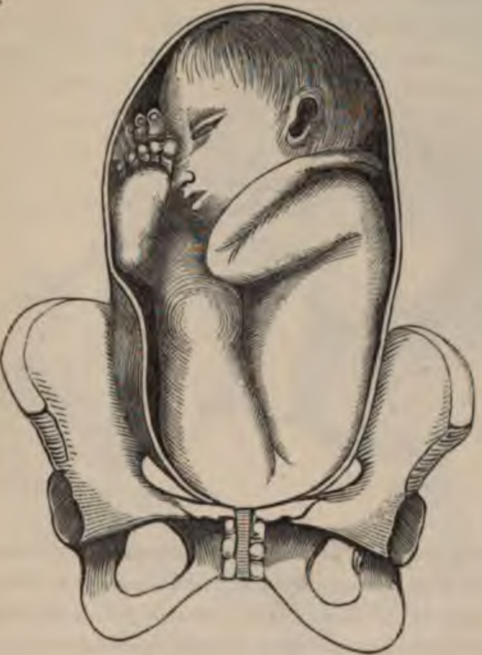
Of 122,679 cases in this country, 1691 were *breech* presentations, or 1 in 72½: the results to the children noted in 1361 cases gave 380 deaths, or 1 in 3⅗.

Of presentations of the lower extremities, the average in 120,525 cases was as 1 in 104⅓, with a fœtal mortality of 311 out of 849, or 1 in 2⅔.

The breech may present in *four* positions; in two of these the abdomen of the child is directed towards the spine of the mother, and both of these are called breech presentations in the *first position;* in the two others the abdomen of the child is directed to the anterior surface of the mother, and these two are called breech presentations in the *second position:* in all of these the transverse diameter of the child's hips occupies the right and left oblique diameters. Of these the former is the more common. Strictly speaking, the position is not exactly such as is here indicated, for the pelvis of the child enters with its long or transverse diameter in the oblique diameter of the pelvis; and, according to M. Naegele, "in every case, whether the nates have at first a completely transverse or oblique direction, they will always be found, on passing lower into the superior aperture of the pelvis, to have taken an oblique position, and that ischium which is directed anteriorly, to stand the lowest. They pass through the entrance, cavity, and outlet of the pelvis in this position, which is oblique, both as to its transverse diameter as well as to its axis."

Supposing the case to be one presenting in the *first position*, that is, with the abdomen of the child directed towards the spine of the mother, the transverse diameter of the child's pelvis may occupy either the right or the left oblique diameter of the pelvis; thus in one the left ischium will be found somewhat lower than the right and nearer to the right foramen ovale, Fig. 136, while the right ischium will be nearest to the left sacro-iliac synchondrosis; in this position it will descend, and the left ischium will be the part first to emerge between the labia. The rest of the trunk follows in the same position, the belly of the child when born being directed towards the inner part of the right thigh of its mother. The shoulders enter the brim in the left oblique diameter, and as these descend, either the arms will be found folded against the chest, or one or both of them will be left up, and may be drawn down so as to make more room for the passage of the head. An important move now takes place, "the head, which during the whole progress of the labor rests with its chin upon the breast, presses into the superior aperture in the *right* oblique diameter (viz., with the forehead corresponding to the right sacro-iliac synchondrosis), and then into the cavity of the pelvis in the same direction, or one more approaching the conjugate diameter." Subsequently the face sweeps into the

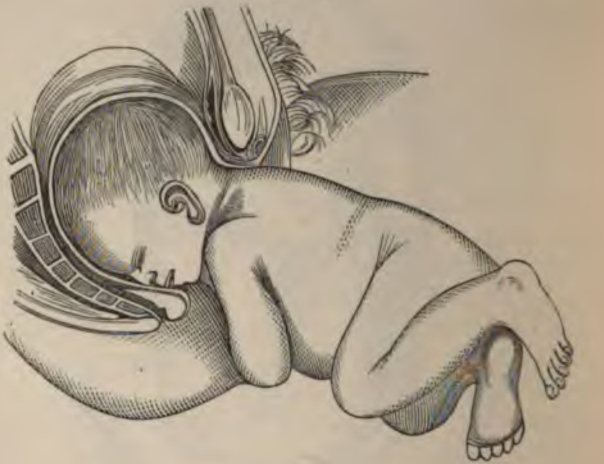
FIG. 136.



hollow of the sacrum, Fig. 137, the occiput gets under the pubic arch, the face becoming more and more flexed upon the chest, and in this position the head is born; the forehead and vertex following the face along the curve of the sacrum emerge successively from the perineum, the occiput being the last to escape from the vagina.

But in the second variety of the first position, though the child maintains the same general position, namely, with its abdomen towards the spine of the mother, the pelvis enters the brim in the right instead of the left oblique diameter, that is, with the left ischium nearest to the right sacro-iliac synchondrosis, and the right ischium against the left obturator foramen. As the child descends, its right side maintains relations with the left of the pelvis, so that when the buttocks are born the right is the first to appear and the abdomen is turned downwards, in the obstetric position, to the left thigh of the mother, Fig. 138. In the further progress of the case, there is not the same uniformity, at least as regards the delivery of the arms; if both remain folded

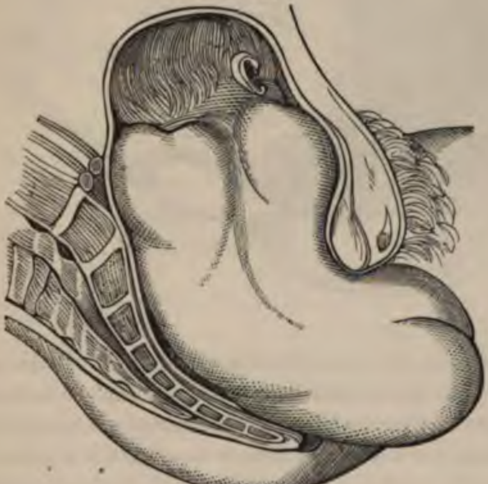
Fig. 137.



on the chest, they will probably be born together, but sometimes one remains and is extended over the head, as in Fig. 139, and may be a source of trouble; if possible, the two fingers of the right hand should be passed up over the shoulder and then down along the upper arm, which should at the same time be pressed on to the chest of the child, the fingers of the operator meanwhile being passed down towards the elbow-joint; by this means we shall probably succeed in bringing it down; the head will then engage the cavity of the pelvis, the face sweeping into the hollow of the sacrum and over the perineum, as before described; the head also enters the upper aperture of the pelvis in the left instead of the right oblique diameter, the forehead being directed to the left sacro-iliac synchondrosis.

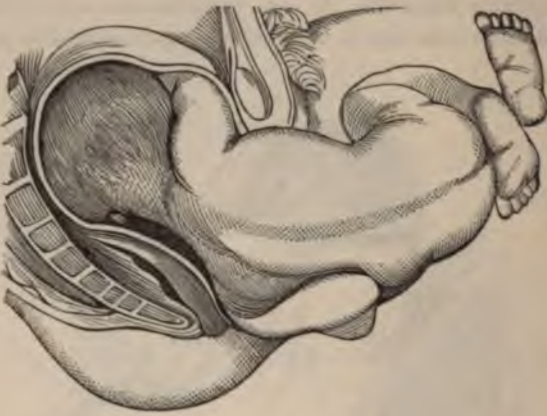
In the *second position* of nates presentations there are also two varieties: in both the anterior surface of the child looks towards the abdomen of the mother; in the one the left ischium is placed forward, is lowest in the pelvis, and is directed against the left acetabulum, and the right ischium is nearest to the right sacro-iliac synchondrosis, so that the hips of the child present in the right oblique diameter. In this position the descent of the child is made, the abdomen continuing to look anteriorly and obliquely, so that when born it is directed to the upper or right thigh of the mother. The head consequently enters the pelvic brim with its long diameter in the left oblique of the pelvis, that is, with the occiput towards the left sacro-iliac joint and the forehead to the right obturator foramen. As the head descends, it is rotated more and more from left to right, the occiput gradually passing to the front, while the face recedes into the hollow of the sacrum. With this, of course, the body of the child turns, or should be turned round, so that the abdomen, from looking forwards and to the right, passes round to the right, and ultimately looks directly backwards, in which position the head is born, exactly as in the two foregoing varieties.

FIG. 138.



In the other variety of abdomino-anterior breech presentation, the right hip is against the right obturator foramen, and is lowest in the pelvis, while the left hip is against the left sacro-iliac synchondrosis; in fact, it presents in the left oblique diameter. In the descent the head enters the pelvis in the right oblique diameter, the forehead looking to the left obturator foramen, the occiput to the right sacro-iliac synchondrosis, and by degrees the same movement of rotation is performed from right to left, the occiput coming more under the pubic arch, the face engaging the hollow of the sacrum, as it did in each of the other varieties. In fact, as Dr. Rigby remarked, "It appears to be a law in nates presentations, that whatever may be the direction of the child (first or second position) at the beginning of labor, it will always, if not interfered with, be found with its anterior surface turned towards one or other of the sacro-iliac synchondroses, when the thorax or the shoulders are beginning to pass through the outlet of the pelvis." And Dr. Collins adds, "It is very desirable the child should be delivered in this position (viz., the back of the child towards the mother's abdomen), as it renders the getting away of the head much less difficult; yet where there has been no interference by the attendant in the previous part of the labor, he will rarely find it necessary to alter subsequently the child's position, the breech naturally making the turn above alluded to in its passage."

FIG. 139.



The *Diagnosis* of a breech presentation is generally tolerably easy. There is the soft, plump, round feel of the buttocks, divided by the cleft in which is felt the anus, and what is far more important, indeed is quite characteristic of this presentation, the sharply pointed movable coccyx, at the further end of which is the hard nodulated sacrum; in the opposite direction may be felt the generative organs, and, on either side, the tuberosities of the ischia will be discovered. These last may be mistaken for the malar bones in face presentations, but in them there is the ridge formed by the nose, while in breech presentations there is the cleft formed by the perineum and anus. Discharge of meconium is also said to be indicative of breech presentation, but it is by no means a reliable sign, for it occurs sometimes in cases of head presentation, especially when the child is dead.

The management of these cases is, as a rule, simple enough, for the less done the better. Usually they are much more tedious than ordinary head presentations, but they mostly terminate without injury to the mother, and would require no interference, except that very often there is great delay in the delivery of the head, and this by pressing upon the umbilical cord places the life of the child in considerable danger. Until after the expulsion of the nates nothing at all should be done, and then, so far from attempting to assist by pulling down the trunk, it is far better, especially if there be any tendency to a rapid expulsion, to *retard* its progress; by this means, the uterus, not being suddenly emptied, slowly and firmly contracts upon the child, and keeps the head down with the chin close upon the chest, which is the best possible position for it to enter the pelvis. It is then pretty sure to be expelled in good time without danger from pressure on the cord. Whereas, after the birth of the nates, if traction be made to expedite delivery, and the uterus does not contract sufficiently rapidly to follow the child down, the head is extended, the chin leaves the breast, the arms are freed and ascend also, and the head enters the pelvis in a much worse position; delivery is consequently delayed, and probably the child is lost.

As soon as any portion of the cord is seen, a loop of it should be pulled down to prevent any stretching, and if possible it should be placed where there seems least likelihood of pressure. Soon after this the arms may one by one be hooked down, by passing up the forefinger and coiling it 'round the humerus. Now, if the head remains, and *the pulsations in the cord are becoming feebler*, we should hasten delivery as much as possible by exerting traction during each pain; and as soon as the head enters the cavity, two fingers of the left hand should be passed up and pressed upon the upper jaw, one on either side of the nose; at the same time that the head is thus pressed down, two fingers of the right hand should be placed over the shoulders and traction be thereby made. The practice of passing one finger into the mouth and drawing down the lower jaw, is very objectionable, as it is apt to injure the child, and at the same time does little towards bringing down the head.

By the means above indicated, delivery will in all probability be speedily accomplished. Of course when traction is being made the direction of the axis of the brim or outlet must be carefully borne in mind according as the head is detained in either of those situations. Should these efforts be unsuccessful, and the child is clearly suffering from the delay, the forceps should immediately be applied and the head extracted. If this fails, and if the child be certainly dead, the head may be opened by the perforator applied behind the ear. This, of course, only refers to cases where speedy delivery is necessary on account of the mother.

Presentations of the knees or feet are of two kinds, according as the toes are directed forwards or backwards, the latter being the more frequent.

In all presentations whether of the upper or lower extremities the membranes frequently rupture very early, and then on examination we find either the feet or the knees, or it may be some part of the upper extremity, will be detected in place of the round hard head. Presentation of the lower extremity may easily be mistaken for presentations of the hand or arm. The feet are distinguished from the hand by the toes being shorter and of more uniform length than the fingers, by the presence of the heel, and the different contour of the ankle and heel as compared with the hand and wrist, by the greater thickness of the foot, and by the big toe not separating from the rest as the thumb does.

The knee may also be mistaken for the elbow; but the knee is thicker, rounder, than the elbow, it has two prominences in place of one, with a sulcus between them, and is much less pointed than the elbow.

In their course presentations of the lower extremity are precisely analogous to those of the nates. They are less injurious to the mother than breech cases, but more dangerous to the children, more than one-third dying before birth. This is explained by the less perfect dilatation of the passages, and the consequently longer delay and greater pressure to which the cord is subjected.

The *treatment* required is precisely the same as that for breech presentation. Nothing should be done to hasten delivery till, at all events, the cord is visible; nor even then, unless there be evidence that the child is beginning to suffer from pressure, when the rules already given should be observed.

PRESENTATION OF THE UPPER EXTREMITY.

From statistics it appears that presentations of the upper extremity occur about once in 243 cases in English practice, once in 208½ in French practice, and with a mortality, as far as can be ascertained, of nearly one in nine of the mothers, and rather more than one-half of the children.

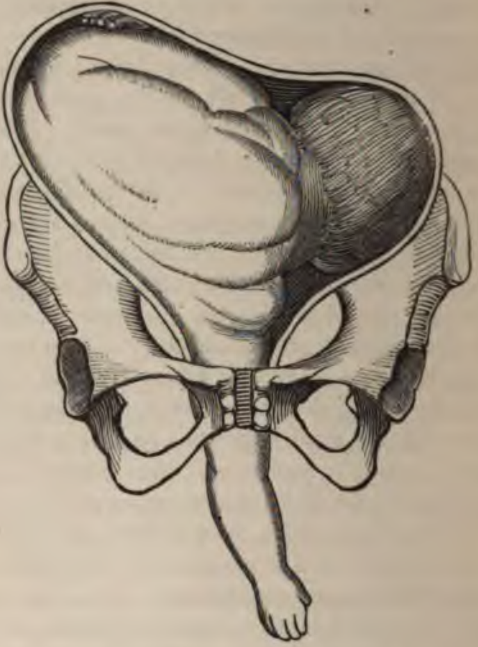
Dr. Rigby believed that the causes of these abnormal presentations are of two kinds. 1. Where the uterus has been distended by an unusual quantity of liquor amnii. 2. Where, from a faulty condition of the early pains of labor, the form of the uterus has been altered, and with it the position of the child. Other causes have also been attributed, such as deformities in the pelvis, obliquity of the uterus, severe bodily exertion, a short cord, or its being twisted round the child, and the placenta being attached to one side of the uterus. Probably in most cases the shoulder is the original presenting part, the arm becoming subsequently prolapsed: occasionally a hand and foot, or both hands, present, but they generally end at last in one arm presenting.

Symptoms.—Before labor begins the patient in whom this malpresentation is about to happen will often complain of irregular cramplike pains in the body, caused apparently by violent jerking movements of the child, very unlike any which she has hitherto experienced. "The abdomen is irregularly distended, and marked with unequal prominences; anteriorly, it is more or less pointed. It is often much increased in breadth, and generally in an oblique direction, forming a globular protuberance at the upper part on one side, and at the lower part on the other; the former is the pelvic extremity of the child; the other, from its size, form, and hardness, may easily be recognized as the head."

In Figs. 140, 141 two varieties of arm presentation are represented; in both it is the right arm which there presents, but the same positions apply also to the left, the child having either its back or its abdomen directed anteriorly, and being named accordingly. Thus we have again the four presentations: Fig. 140, dorso-anterior with the right arm, first position; Fig. 141, dorso-posterior with the right arm, second position; the third and fourth positions being respectively dorso-anterior and posterior with the left arm.

When labor begins, and even for some time after its commencement, we may be unable to detect any presentation: this alone is sufficient to excite suspicion, not perhaps as to the exact nature of the case, but at all events it is suggestive of something being wrong, and it should be remembered that the same may occur in breech cases, in hydrocephalus, in distorted pelvis, pendulous abdomen, or in twins. After a time the hand, elbow, or shoulder is discovered, or the membranes are found projecting into the vagina, not in the ordinary rounded form, but small and conical, just, in fact, as we should expect them to be when enveloping either of those parts in place of the head.

FIG. 140.



There is sometimes considerable difficulty in *diagnosing a shoulder* presentation. The following are its leading characters: the presenting part is much smaller and softer than the head, but larger than the elbow, and wanting in the two prominences with the groove between them which is characteristic of the knee; further, the scapula, with its hard bony spine, the neck and the ill be felt by a closer examination, and these cannot fail icate the presentation. The differences between the hand ot have already been given. The position of the thumb

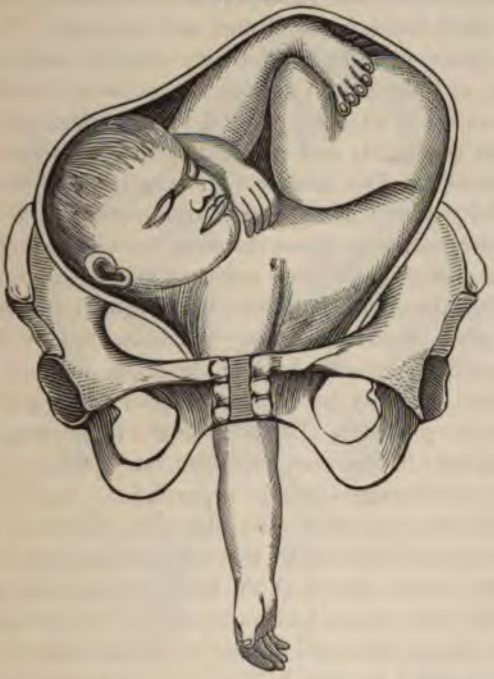


FIG. 141.

e direction of the palm will show to which side the hand s.

Treatment of these cases is necessarily operative, and the interference is resorted to after the full dilatation of the better; it is scarcely possible for the labor to be finished natural efforts. Indeed, when once the membranes have ed, every pain only increases the danger and difficulty of se, for the uterus becomes firmly contracted upon the child: is not merely during the pains, but almost constantly. The er, if that is presenting, gets jammed down more and more e pelvis; the pains increase in intensity from the resistance by the immobility of the child, and the consequence at either that rupture of the uterus takes place, or the mother becomes worn out by exhaustion, and the child is destroyed by the long-continued and general pressure.

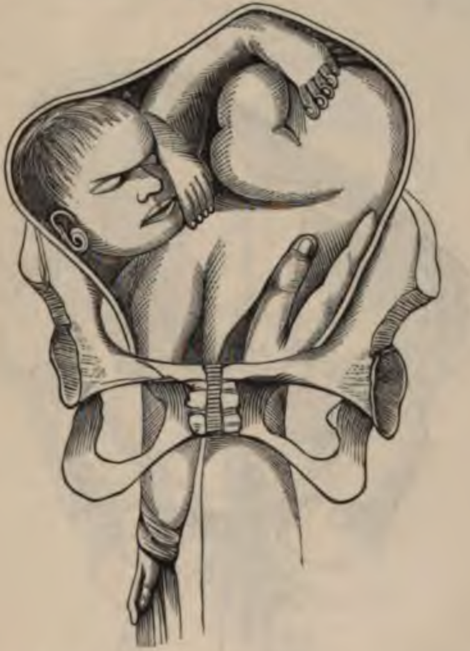
The proper treatment to adopt in such a case is turning; but, supposing that when the diagnosis is first clearly made out the membranes are still entire, and the os is not yet fully dilated, we must wait until that is accomplished, and then turn. The patient ought not, however, to be left, for very often the membranes rupture early, and then, even though the os is still undilated, we must not wait, but at once proceed to turn, gradually dilating the os with the hand, and preventing the malpresenting part from descending. The best time for turning is, of course, when the os is fully dilated and the membranes entire. Where there is any rigidity of the os, where the pains are violent and frequent, or where the membranes have ruptured and the uterus is firmly contracted on the child, chloroform will be found a most valuable agent; it often renders that easy which was before difficult or even impossible. Bleeding, tartar emetic, and opium are also recommended. I have before stated, when treating of rigid os, my reasons for preferring the tartar emetic to bleeding.

The subjoined illustrations represent the operation of turning under the circumstances of arm presentation. In Fig. 142 the right hand of the operator is introduced on the left of the pelvis along the right side of the child, that being the position where there is most room; at the same time the left hand should be placed outside to steady the uterus, and to prevent the child being pushed away. As soon as the hand reaches the fundus uteri the feet will be felt, and should be laid hold of in the manner already described, and as is shown in Fig. 144. By a little steady traction the child will soon turn, and in doing so the protruding arm will again be drawn within the uterus.

In cases where the left arm presents, the operator will probably find it more convenient to introduce his left hand, and this he should do on the right side of the pelvis, along the chest and left side of the child, as is shown in Fig. 143, while at the same time the right hand, placed externally, will assist in the operation by pressing the buttocks of the child round in the direction it is taking during traction. For further particulars see the chapter on Turning.

When the membranes have been some time ruptured, the liquor amnii all drained away, and the operation of turning cannot be accomplished, even after some or all of the measures mentioned above have been adopted, there is then nothing left but to perform embryulcia. The chest must be perforated at the most depending part, and the thorax, with, if need be, the abdomen, eviscerated; the child may then be extracted. In some cases decapitation may be necessary.

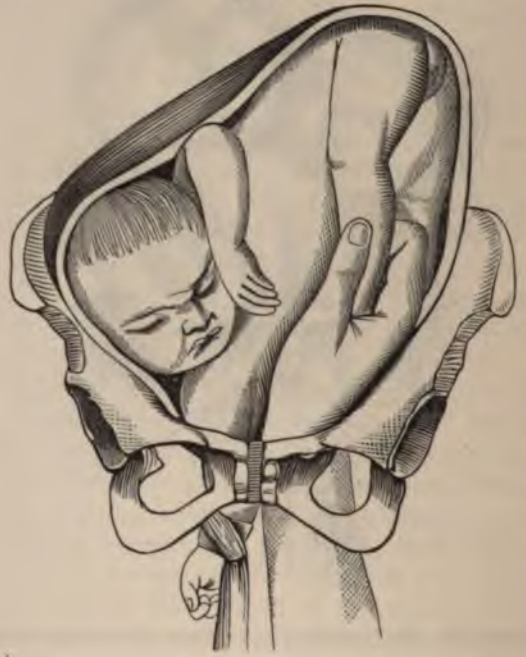
FIG. 142.



In certain very rare cases—so rare, indeed, that we cannot safely trust to it—Nature has been able to effect expulsion without artificial interference, by a process which has been called "*Spontaneous Evolution*" or "*Spontaneous Expulsion.*" The former name was given to it by Dr. Denman, who first described the process; the latter by Dr. Douglas, who thus points out the cases where such a result may be anticipated: If the arm is almost entirely protruded, the shoulder pressing on the perineum, with a considerable portion of the thorax in the hollow of the sacrum, and the axilla low in the pelvis, and if the uterine efforts are still powerful, the thorax being forced sensibly lower during each pain, then "evolution may with great confidence be expected."

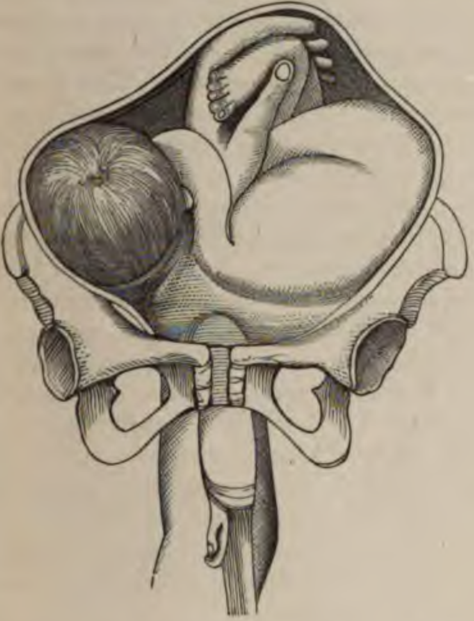
It was first supposed by Denman that during this evolution the presenting shoulder and arm receded into the pelvis, the body being bent round, so that the breech of the child came down and was expelled. It is now, however, well established that the process, as subsequently described by Dr. Douglas, is the correct one; that the arm does not in the least recede, but is rather driven down more and more as expulsion advances. The head is fixed in the pelvis against the pubis; "the arm and shoulder are entirely protruded with one side of the thorax, not only appearing at the os externum, but partly without it. The lower part of the same side of the trunk presses on the perineum, with the breech either in the hollow of the sacrum or at the brim of the pelvis, ready to descend into it; and, by a few further uterine efforts, the remainder of the trunk, with the lower extremities, is expelled."

FIG. 143.



For this proceeding it is necessary, either that the pelvis should be very roomy, or the child very small, and in both cases strong uterine action is essential. It is by no means devoid of danger the mother, and very rarely indeed is the child born alive. by thought that spontaneous expulsion could rarely, if ke place except where the child had been already dead ne, or was premature. This, however, I can testify is not the case, for I have personally witnessed this proceeding The child was not born alive, but it was alive just before nd was certainly not premature though it was rather small ; a case in which I had been called in consultation, and it reed that embryulcia was necessary. I was in fact in the preparing the instruments for that operation, when violent action set in, the protruded arm was driven down more re, and first the chest, then the abdomen were forced out, ild being doubled on itself; the pelvis followed, then the extremities, and so the child was born. All this was the f a few minutes, during which time I did nothing but watch ceedings with great interest; there was no occasion, nor, , was it necessary to render any assistance.

FIG. 144.



OTHER MALPRESENTATIONS.

The Hands and Feet, one or both, may present together, and with them occasionally *the Cord* prolapses, owing to the position of the body. As labor advances, the case is sure to end by the presentation either of the hands or feet; and it should be watched closely until it is evident which part is about to descend: sometimes we may at once draw down the feet, and so terminate the labor as in ordinary breech presentation. This is rendered absolutely necessary where the cord is being subjected to any pressure.

The Hand and Head sometimes present together, though rarely. The head is generally found to be very awkwardly placed with regard to the pelvis; added to which, the increased bulk caused by the hand at first, but subsequently by the arm, may occasion an insurmountable obstruction. Attempts should be made to return the hand as soon as possible, while the head is allowed to descend; and if now delay is occasioned, we may resort either to the forceps, turning, or craniotomy: the latter, however, is seldom necessary, for, as Dr. Merriman observed, "this complication seldom happens but in a wide pelvis." Sometimes the hand will of itself recede by the head being pressed down into the pelvis.

The Feet and Head are said occasionally to constitute a presentation. If possible, for the safety of the child, the head should be allowed to descend; but if that cannot be accomplished, the feet may be brought down, and the rest of the case treated as an ordinary breech presentation.

This seems naturally the most fitting place to consider the subject of

FUNIS PRESENTATION.

Prolapse of the Cord must always be regarded as a serious complication in labor, on account of the great danger to which the child is exposed from the pressure which must necessarily take place, and the consequent liability to arrest the circulation. As far as the mother is concerned there is no danger incurred in this accident, but more than one-half of the children are destroyed by the means alluded to; thus out of 787 cases 410 ended fatally to the child. It seems to occur in this country about once in 232½ cases, for according to Dr. Churchill it occurred 521 times in 121,147 cases; but, curiously enough, in France there were but 98 cases of funis presentation in 36,546, or about 1 in 373 cases;

while in Germany the proportion was 197 in 31,037, or about 1 in 162⅔. It is an accident which may happen either at the commencement or during the progress of labor, and it may be associated with almost any other kind of presentation. It exercises no marked influence upon the labor itself, and might so far as that is concerned be entirely disregarded; but it is a very important complication as regards the child, for it places the life of the child in imminent peril from the pressure to which the cord is subjected and the stoppage of the circulation which that pressure entails.

There is not usually much difficulty in recognizing this condition; for even if the membranes are unruptured, we shall generally be able to feel a small coil, soft and round, and very movable, unlike any other part of the child, but somewhat resembling a coil of collapsed intestine—differing from it, however, in *having a distinct pulsation which is not synchronous with the mother's pulse.* At first sight it might seem almost impossible that any one could mistake a coil of intestine for the funis, yet this has happened on several occasions; four cases indeed have been recorded within the last twenty years. In all cases, of course, there was rupture of the uterus or vagina as well, and, strange to say, in all the same mistake led to the same treatment, and ended in death, the prolapsed intestine having been cut away. A trial for manslaughter in each case resulted in a verdict against the medical attendant, notwithstanding that in three of them the rupture took place while the patient was attended by midwives.

In one of the cases some of the details are thus given by Dr. Tyler Smith in his Annual Address as President of the Obstetrical Society of London, published in the fifth volume of the *Transactions.* "In this instance a midwife attended the patient, a very poor woman, during her labor, and she admitted having given ergot before the birth of the child. Mr. Robinson was called at midnight to remove a retained placenta, going as a matter of charity. On examining he found what seemed a loop of funis in the vagina; passing his hand along it, and through what he thought was the os uteri, he felt a mass of about the size of the placenta, which he drew down. Finding some difficulty, he divided the supposed funis in two places, and then found to his horror that he had been dealing with intestine. At the post-mortem and inquest it was shown that a laceration existed at the upper part of the vagina, through which the bowel had passed, and the placenta was still in utero, with the funis broken short off. The real facts were, no doubt, that the laceration occurred during labor, probably from the ergot; that the midwife tried to remove the placenta, and in doing this tore the umbilical cord from its attachment. This was not mentioned to Mr. Robinson. The loop of intestine descended, as it often does in such cases, through the rent. Mr. Robinson, called at this peculiar juncture, fell into the trap," and hence what followed. The case is of extreme importance, and should be carefully borne in mind. Other cases of this kind have occurred more recently, and have occasioned considerable discussion on the question as to what treatment should be adopted under circumstances such as these. A practitioner was attending such a case and he unintentionally cut away a large portion of intestine; finding out his mistake he endeavored to conceal the proof of what he had done, in fact he threw the portion of intestine down a privy; probably if he had not shown so much anxiety to conceal his mistake, still more if he had boldly defended his practice, as was, with perhaps questionable propriety, attempted to be done for him at his trial, no further proceedings might have been taken; but the patient died soon afterwards, and the friends, noticing his anxiety, became suspicious, informed against him, and he was apprehended, tried, convicted, and sentenced. The interest of the case lies in the defence set up for him by some distinguished obstetric authorities, viz., that the practice in question, that of cutting off the prolapsed portion of intestine, not only was not necessarily wrong, but might in fact under certain circumstances be the best practice to pursue as tending possibly to prolong life! Neither the judge nor the jury could, however, be made to see it in that light, and a conviction accordingly followed.

Mauriceau, who was the first to describe prolapse of the funis, mentions three probable *Causes*. First, a large quantity of liquor amnii; secondly, a long cord; and thirdly, malposition of the child, especially presentation of the upper or lower extremity. Other causes are also mentioned, such as a small child; rupture of the membranes, the os being fully dilated, and the sudden rush of a large quantity of liquor amnii; irregular shape or action of the uterus; the placenta being situate low down in the pelvis; or the funis being inserted into its lower edge; and lastly, a large pelvis. Dr. Rigby thought that the chief cause which prevents prolapse of the cord is the closeness with which the inferior por tion of the uterus encircles the presenting part of the child; "without this, from the erect posture of the human female, there would be a liability to prolapsus of the arm or cord in every labor," and "whatever prevents the uterus from contracting with its inferior segment upon the presenting part of the child, deprives the cord of its natural support, and therefore renders it liable to prolapse."

In the *Treatment* of prolapse of the funis, it is important to discover first if the child be alive, as otherwise we need not take any trouble in the matter. If it be alive our first care is to preserve the membranes entire, as they will probably prevent, at least until the os is fully dilated, any fatal pressure on the cord. The following are some of the measures recommended for the treatment of these cases: 1. *Turning;* by this means a large number of children have been saved, more probably than by any other; at the same time the risk to the mother must not be lost sight of. 2. *The Forceps;* this will only be applicable to cases where the os uteri is fully dilated and the labor far advanced. Care must be taken that the cord does not get between the head and the forceps or between the uterus and the forceps. Of these two operations it may be said that the former is suited to the earlier, the latter to the more advanced period of labor; in both our aim is to expedite delivery before any fatal pressure is exerted on the cord. It must be borne in mind, however, that the operation of turning is itself a dangerous proceeding as regards the child, and therefore ought not to be lightly undertaken, and certainly not unless the parts are so dilated that delivery may be anticipated very speedily, so that the pressure on the cord which must necessarily ensue whenever turning is resorted to, shall not be so prolonged as to lead to a fatal result. 3. The other methods aim at *replacing the cord* and retaining it within the uterus above the pelvic brim until the head descends; it should be carried "above that circular portion of the uterus which is contracted over the presenting part," and when so placed it may be kept there either by the finger, or by being hooked over the limbs of the child, or by being placed in the hollow of the neck, or by means of a piece of sponge introduced within the uterus, or it may be retaintd by an elastic catheter, which may also be used to push it up inside the uterus.

Lastly, what is called *the postural method* may be adopted, and the ease with which it can be carried out, coupled with the great success which attends it, will probably, as it ought to, make this the principal plan of treatment for all cases of funis presentation. The method in question may be thus carried out: the patient being placed on her elbows and knees, or rather on her chest and knees, so as to make the upper part of the body an inclined plane, with the head lowest, which the knee-elbow position will not secure, the cord will probably gravitate towards its proper position: it should, in fact, fall back again into the uterus—such at least is the object sought; failing to do this, it may be replaced by the fingers, and by keeping the patient in the position indicated for a little while, the pains will force down the head and thus prevent any further prolapse. This method has been successfully practiced by Dr. Thomas of New York, who first proposed it, and there can be no doubt that it is sound both in theory and practice; at the same time it is not altogether free from objection, as the late Dr. Lumley Earle pointed out: the position is, to say the least, very inelegant and is most irksome to the patient. Not infrequently prolapse of the funis takes place at an early period of labor, when the pains are feeble and occur at long intervals, the patient may therefore have to be kept in this position for a long time; sometimes it gives rise to a restless feeling and a sense of suffocation, probably from pressure of the fundus uteri on the diaphragm; to remedy all this Dr. Earle suggested placing the patient on her left side with the hips elevated by means of pillows so arranged as to form an inclined plane, with the buttocks resting on the highest point and the waist on the lowest. The principle is the same, but the mode of application is far easier to the patient.

The suggestion to place the cord in some part of the pelvis where it shall be least subject to pressure, is practically of very little value, for every part of the pelvis is so closely occupied by the child in its descent that there is no corner in which we can hope to elude the pressure.

Whenever there is a doubt as to whether the child is living or not, judging from the condition of the cord only, the greatest care should be taken by auscultation and other means to determine the question, and should doubt still exist, it is better to act on the supposition of its being alive, and effect delivery as quickly as possible. Of course, if the cord be protruding beyond the external parts, and has become cold, flaccid, and pulseless, no reasonable hope can be entertained that the child is living, and the labor may therefore take its course: there is no need to interfere under such circumstances.

PART VI.

COMPLEX LABOR.

THOUGH in a certain sense all complex labors are unnatural, and as such I have classed them with that division, yet there is, I think, a certain convenience, not perhaps in practice but in study, in considering them in a separate Part of this work, and I propose, therefore, to treat of them here in the following order:

1. Retention of the placenta.
2. Hæmorrhage, avoidable and unavoidable.
3. Puerperal Convulsions.
4. Ruptures of the Uterus, Bladder, Perineum, etc.
5. Inversion of the Uterus.

CHAPTER I.

RETENTION OF THE PLACENTA.

THE term "retention of the placenta" has received a different signification from different authorities; some consider that if an hour or an hour and a half elapse after the birth of the child before its expulsion from the uterine cavity, then it is retained; others fix the time at three, four, or more hours. The former would seem, under ordinary circumstances, the more correct of the two, excepting, perhaps, those cases in which labor had been very tedious, and the uterus consequently fatigued.

In ordinary cases the placenta is separated and expelled within a few minutes after the birth of the child; but it occasionally happens that it is retained either by—1, deficient uterine action after a tedious or precipitate labor; or 2, by some abnormal contraction (hour-glass) of the uterus, when it is said to be encysted; or 3, by being morbidly adherent to the uterine parietes. It appears to happen, from one or other of these causes, about once in 390 cases, and to be followed by a maternal mortality of something like one in six, the cause of death being chiefly hæmorrhage.

When the placenta is retained by a want of uterine action it may either remain attached to the uterus, or it may be partially or entirely separate. In the former case no evil consequences result, at least for a time: but in both the latter, hæmorrhage from the denuded vessels, proportionate to the extent of surface separated, and the degree of flaccidity of the uterus, follows. Sometimes it takes place to a very alarming and even fatal extent.

This condition is easily *diagnosed* by the entire absence of uterine action, and by the large, loose, flabby feel which the uterus presents through the abdominal wall, by the occurrence of hæmorrhage, and by the fact that the placenta is still in utero.

The *Treatment* required is first to excite uterine action, and then to remove the placenta. If this be detached, and lying loose in the cavity of the uterus, the hand should be introduced to take it away, firm pressure being at the same time exerted on the fundus uteri; friction and cold cloths may also be applied, and, if needful, ergot should be given to excite contraction; but very often the mere presence of the hand in the uterus will suffice for this purpose. If the placenta be still attached, but not morbidly adherent, this very action will often cause its separation and expulsion.

Abnormal or irregular action of the uterus occurs sometimes after the birth of the child, producing a kind of stricture at some part of the organ, the placenta being detained in the upper cavity. This irregular action may be limited either to the internal or external os, or to some part of the body of the uterus: in the latter case it gives rise to what is called *hour-glass contraction*. The two former of these conditions is much the more common; indeed, of late years, it has been seriously questioned whether the latter ever exists at all. I have, however, seen four cases which were quite unmistakable, and I am convinced, therefore, that this form of irregular uterine action does undoubtedly occur sometimes. There was, in all the cases alluded to, a considerable space between the external os and the seat of stricture, above which was encysted the placenta. I am satisfied that in these the space in question involved more than the cervical portion of the uterus—that, in fact, a good part of the body of the uterus was below the seat of stricture.

The *Diagnosis* of these irregularities is often very obscure, no reliance can be placed on any symptoms which may present themselves; there may be hæmorrhage; sometimes there is violent and irregular contraction following quickly on the birth of the child, but without expulsion or even descent of the placenta; while externally the uterus is felt large and hard, and if traction be made on the cord the placenta will not be found to descend. But the case will be more easily recognized by a vaginal examination; then we shall either discover that the os uteri has contracted so firmly that we cannot introduce the fingers into the interior, the cord itself being grasped by the quasi-spasmodic action, and being quite immovable on traction; or the os externum may be patulous and soft, but a constriction exists at the situation of the os internum; or lastly, the fingers may discover an open space formed by the lower half of the uterus, immediately above which is a constricted portion, and on passing the forefinger beyond this a second cavity is discovered, containing the encysted placenta.

The commonest *Cause* of these abnormal actions of the uterus is stated to be "over-anxiety to remove the placenta; the cord is frequently pulled at, and at length the os uteri is excited to contract." This condition is also sometimes produced by sudden emptying of the uterus, as in precipitate labor, the uterus not having time to contract uniformly; sometimes it occurs after long-protracted labor, the uterus being worn out, and therefore liable to irregular action; lastly, irregular contraction of the uterus may arise from the action of the ergot of rye. Over-distension of the uterus, as from twins or excessive liquor amnii, or the introduction of a cold hand for the purpose of removing the placenta, or cold instruments for delivering the child, are also believed to be causes of this condition; and sometimes it occurs in cases of morbid adhesion of the placenta.

The *Treatment* should aim first at relaxing the irregular spasmodic action, and then at removing the placenta. Generally, the longer the case is left without interference, the worse does the contraction become; while in others the spasm passes off after awhile, and by a regular contraction expulsion is effected. It is best, however, as a rule, when once the condition is recognized, to interfere and remove the placenta; in some cases, especially where the stricture is low down, simple traction, continued steadily for some time, will suffice to overcome the spasm. Should this fail, the finger or the entire hand, if need be, must be introduced, care being taken gradually to insinuate the hand through the contracted orifice, the fingers being drawn up in a conical form; as soon as the placenta is grasped, the uterus will probably contract on the hand as this is slowly withdrawn. No other treatment will usually be necessary, unless there be a continuance of irregular spasmodic and painful action, when the exhibition of opiates and antispasmodics will be of service.

Retention of the placenta from morbid adhesion to the uterine parietes occurs now and then as a result of previous diseased action, mostly of an inflammatory character, either in the placental tufts or on the uterine surface, the consequence being an effusion of lymph and cohesion of the opposed surfaces. In some persons there seems a liability to a recurrence of this condition. It will generally be noticed that in these cases the uterus contracts firmly round the placenta, which thus becomes inclosed in a separate cavity, giving rise to a sort of hour-glass contraction, and no amount of uterine action is sufficient to separate or expel the mass. The adhesion is in some cases of very limited extent; in others the union is almost complete in every part, and so firm is it at times, that not even the breaking up of the placenta is sufficient to tear it from its connections, which thus hang in shreds from the uterine parietes.

The *Diagnosis* can only be made out by digital examination, though suspicions of the case will be excited if after some uterine action, together with traction on the cord, no descent of the placenta takes place; but on attempting forcible extraction the true nature of the case at once becomes manifest. Very often there is a previous history of pain, severe and long-continued, in some one spot where the placenta is found adherent, and the patient often has a conviction that, as she says, "the after-birth has grown to her side."

Treatment.—If there be no hæmorrhage, there need not be much anxiety for the present; but if the nature of the case be clearly made out, nothing is to be gained by waiting, and the sooner extraction is attempted the better; the longer it is allowed to remain the more spastically does the uterus contract upon it; and where hæmorrhage is going on from a separated portion, no time is to be lost. For the removal of the mass the hand must be introduced into the uterine cavity, and the fore and middle fingers be insinuated between the uterus and placenta at some part of its circumference, thus gradually and cautiously picking off, as it were, the placenta from the uterine wall.

As the chief danger to be apprehended in these cases is the retention of some portion of the placenta, and its subsequent decomposition and absorption, giving rise, probably, to some form of puerperal fever, together with a continuance of the hæmorrhage, so the great point to aim at is the complete separation and removal of the mass. At the same time great care is needed to avoid injuring the uterine parietes with the finger-nails; and if the adhesion be so intimate that considerable force is necessary for separating it, it is far better to leave a portion adherent, and to be careful about its subsequent management, than to run the risk of injuring the uterus, which experience shows is a very serious matter.

Supposing, then, that the adhesion is of this intimate character, and that all which can be removed has been; we may expect from the portion which remains that one of three things will happen: either the mass may be separated and expelled in the course of a few hours or days; or it may be retained till decomposition has set in, and the mass comes away in a putrescent state with the discharges; or lastly, according to some, the retained fragment is never expelled, but is either absorbed, or remains to some extent adherent as a portion of the uterine surface.

If the placenta be retained until it is decomposed, there is often very considerable constitutional disturbance, the portion left in utero becomes putrefied, absorption takes place, the system is infected, and symptoms resembling those of pyæmia set in. The patient is seized with shivering, has a hot and dry skin, dry tongue, quick pulse, suppression of the milk, and perhaps of the lochia also, great prostration of strength, with evidence of unhealthy inflammation going on in the uterus itself. In such a case the vagina, and even the uterus, should be washed out frequently with warm water, to which should be added some disinfecting fluid, such as Condy's solution; warm poultices should also be kept over the abdomen, and the patient's strength be supported till the danger has subsided by the gradual elimination of the poisonous matter. For the rest of the treatment see the chapter on Puerperal Fever.

In certain rare cases the placenta has come away after many days of retention without the slightest appearance of putrefaction. Denman had one such case, where the placenta was retained fifteen days, and then expelled; and subsequent experience has confirmed the observation, that not only may the placenta be retained without decomposition, but it may even be absorbed in great part, or entirely, without serious evil consequences. The same thing happens occasionally in cases of abortion, where not only the placenta but the membranes are retained and never come away, and where the subsequent occurrence of pregnancy makes it probable that these structures have all been absorbed.

CHAPTER II.

HÆMORRHAGE.

THERE is, perhaps, no subject in the whole range of obstetrics of deeper importance to the practitioner and the patient than that which this chapter is intended to discuss: to the practitioner, because it requires the greatest vigilance and promptitude of action under circumstances often the most trying to his skill and courage; to the patient, because of its terrible fatality, and the evil consequences which may follow even after its successful management; and to both, because of its frequency, its difficulties, and the variety of conditions under which it is produced.

Dr. Churchill states that in 170,221 cases, hæmorrhage occurred 1370 times, or about 1 in 124; and of 782 cases, 126 mothers died, or about 1 in 6; while of 944 cases, 288 children died, or about 1 in 3.

He further shows that out of 257 cases of so-called accidental hæmorrhage, 34 proved fatal, or about 1 in 7; while of 292 cases of unavoidable hæmorrhage, 79 proved fatal, or 1 in 3½; and out of 365 cases of post-partum hæmorrhage, 25 proved fatal, or about 1 in 14.

It may be broadly stated that nearly all the forms of hæmorrhage connected with parturition (all without exception before the birth of the child) are caused by *partial separation of the placenta*, and consequent laceration and exposure of the blood-vessels. But notwithstanding this similarity in *cause*, hæmorrhage takes place under very different conditions: it may occur before, during, or after delivery; in the latter case it depends upon a variety of causes; in the two former it arises either from an *accidental* separation of the placenta, which may have been in its *normal situation;* or from an *unavoidable* separation of that structure consequent on its *malposition*, as when it is situate either wholly or in part over the os or cervix uteri, thus rendering delivery impossible, and hæmorrhage therefore unavoidable, without its separation. "The very action which Nature uses to bring the child into the world is that by which she destroys both it and its mother" (Naegele's Lectures). Hence the division of hæmorrhages before delivery into two great classes, *Accidental* and *Unavoidable;* for the first clear exposition of this subject the profession is indebted to the elder Dr. Rigby for his *Essay on Uterine Hæmorrhage.*

ACCIDENTAL HÆMORRHAGE.

This variety of hæmorrhage, occurring before delivery, happens in cases where some portion of the placenta has been detached from the uterus, the placenta itself being normally placed. The bleeding may show itself externally, when the membranes are sufficiently separated to admit of its escape; or it may go on insidiously within the uterine cavity, without escaping externally, to a large and even fatal extent. The amount varies with, though it is not uniformly proportionate to, the extent of surface separated; a very slight separation may occasion fatal hæmorrhage; and the effect of the loss will depend not only on the condition and constitution of the patient, but also on the rapidity of the flow.

The supposed *Causes* of this placental detachment are mostly mechanical, such as falls or blows, or other injury; but it may also result from violent mental emotion, probably exciting some local uterine action and consequent separation. I have known it result from the patient stretching to reach something off a high shelf; it has also resulted from any over-exertion, straining, or making other violent efforts, and it not unfrequently occurs from the jar of driving over a rough road, or in some uneasy conveyance. Railway travelling has also a similar effect.

The *Symptoms* are generally sufficiently plain: pain in the seat of injury, followed by a general sense of uneasiness and distension, with possibly rigors and fainting, quick feeble pulse, and the visible and common indications of loss of blood, such as pallor, coldness of the surface, restlessness, dim vision, noises in the ears, sighing; ultimately, unless arrested, a sense of suffocation and a species of convulsions may come on, followed by a more deadly syncope, and death.

All this may go on without any show of blood externally; the placenta has been detached at some part of its surface, and blood has been pouring in large quantities into the uterus, separating the membranes round about, but not escaping from the uterine cavity. The fact of a blow, a fall, or other mechanical injury having been inflicted, should, with the occurrence of any of the symptoms mentioned above, excite suspicion of the nature of the case.

It is not always, however, that no blood is visible externally, for in truth it may be flowing away in quantity sufficient to appal even the stoutest heart. If labor be in progress, it will be noticed that *during a pain the hæmorrhage stops*, the bleeding orifices being closed by uterine contraction. In like manner, when fainting supervenes, the hæmorrhage will stop; but it returns as consciousness returns. On examination *per vaginam* the os will be found soft and dilatable in proportion to the amount of blood which has flowed, it will also be more or less patent according to the previous amount of uterine action.

The *Diagnosis* between accidental and unavoidable hæmorrhage is not generally very difficult; for, 1. In the *former* the discharge is *arrested by pain* and comes on in the interval, in the *latter* it is *increased* by pain and stops in the interval; 2. The *membranes* will be felt in the *former*, with probably, if labor has sufficiently advanced, the head or some other part of the child presenting, or at least accessible to touch; in the *latter* a soft substance, the *placenta*, will be felt over the orifice, or close to it; 3. In the *former* the os is thin, in the *latter* very thick and strongly marked with pulsation; 4. In the *former* there is a history of mechanical injury, the flooding coming on very shortly afterwards; in the *latter* there is no such history, but the bleeding "began of itself," when probably the patient was doing nothing—she may even have been asleep—it came on suddenly, and may have stopped as quickly.

There is also another distinctive feature between the hæmorrhage from placenta prævia and the accidental variety, viz., the difference in the character of the fluid as it flows out. Thus, in the case of the former, the blood gushes away directly from the opened vessels, in the latter it is often little else but liquor sanguinis; in the former the vagina is often filled with coagula, in the latter there is nothing of the kind, for "the blood before being discharged, has to find its way to the os, separating the membranes as it comes down and depositing its fibrin, so that the discharge is liquor sanguinis, and the vagina is free from clots." Dr. Calthrop was, I believe, the first to notice this point; and though I see no improbability in its occasional occurrence, I am bound to add that I have never yet met with a case in which the difference pointed out existed, at least to any marked degree.

Treatment must necessarily vary according to circumstances. If the hæmorrhage is slight, showing that the detachment of the placenta is also slight, pregnancy not having advanced to full time, we may be able to subdue it by rest in the recumbent posture, cool drinks, and astringent medicines, of which I prefer the acetate of lead, two grains of the salt given with half a drachm of dilute acetic acid to prevent its decomposition in the stomach, every four or six hours. Should this not suffice, then gallic acid, or sulphuric acid, as in the Infus. Rosæ Co., or both combined, which, according to the late Dr. Earle, is far more powerful than either singly, may be tried. Opiates should also be given in pretty large doses. Digitalis is recommended by some as valuable in all forms of accidental uterine hæmorrhage, but it has uniformly failed in my hands. If these measures do not suffice, and the discharge is profuse, the vagina should be plugged.

Where the patient has not advanced to full time, this last proceeding should, if possible, be avoided, as its effects will probably be to bring on labor; but this consideration will, of course, be of little moment if the hæmorrhage is great and other means fail, for the consequence to the child will be pretty certainly fatal, therefore the sooner expulsion takes place the better. To be effectual, the plug must be firm and the vagina completely filled; some soft linen or silk handkerchief, tow, or cotton-wool, or other substance which can be easily introduced, and is soft so as not to hurt the maternal structures, should be used, and it should be introduced gradually, little by little, and be forced well up to the os and cervix. The insertion of this plug will be painful or otherwise according to the manner of applying it; great care should be taken in inserting each separate portion not to push in the skin of the labia, for this causes great pain; the labia should be carefully separated and held apart before the plug is passed in. The effects of the plug will be enhanced if at the same time a firm binder or bandage is applied over the abdomen. Care must be taken that while the vagina is full, it is not distended, as otherwise pressure will be exerted on the neck of the bladder and rectum, and so prevent their evacuation.

But, supposing that from the first the discharge is very great, that it is accompanied by pain, and that pregnancy has advanced to full time, our object now is not so much to stop the bleeding as to encourage uterine action, and thus expedite delivery. This at the same time will have the effect of arresting the flow. Puncturing the membranes is the step most likely to succeed; the contents of the uterus being diminished by the escape of the liquor amnii, it contracts, "the open orifices (of the vessels) are in a degree plugged by the parietes being brought into closer and stronger contact with that portion of the placental mass disunited from the uterine surface, and the pains are usually increased in frequency and power by the augmented stimulus impressed upon the os uteri." From the loss of blood the os is softened and readily dilates, so that labor advances pretty rapidly; if uterine action flags ergot should be given, for, as before stated, the hæmorrhage always stops when the uterus contracts. If the bleeding is excessive and the os dilates slowly, the vagina must be plugged: this will probably arrest the discharge; if it does not, then attempts should be made to dilate the os artificially by means of the india-rubber expanding bags. Galvanism has been recommended by some authorities as an exciter of uterine action. If the os is fairly dilated and the bleeding still continues, the forceps or turning should be tried so as to complete delivery as soon as possible; or if the child is known to be dead, craniotomy may be performed with the same object in view.

Lastly, supposing that the patient is apparently dying from loss of blood, as a *dernier ressort* transfusion should be attempted. The operation will be described hereafter in treating of the subject of post-partum hæmorrhage.

The after management of the case will be guided by general principles, in accordance with the particular circumstances attending it.

PLACENTA PRÆVIA.

That form of hæmorrhage to which the term *unavoidable* was and still is applied, depends always, as has already been said, upon *malposition of the placenta*, and its being situate over some portion of the cervical region; to this the term *Placenta Prævia* has been given. It occurs about once in every 480 or 500 cases.

The *Cause* of this misplacement of the placenta is at present quite unknown, notwithstanding that the condition was recognized even in the time of Hippocrates, who wrote upon its fatality and importance. We are, however, equally ignorant of

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the cause which mostly fixes the placenta in any other part of the uterus. Some have suggested the possibility of the ovum, which ordinarily, on reaching the uterus, remains near the Fallopian tube, dropping in these cases to the lower part of the uterus in consequence of some unusually soft and relaxed condition of the decidua lower down. Mauriceau and La Motte thought that the placenta had originally occupied its proper position, but subsequently dropped; these hypotheses are, however, purely speculative, they rest upon no accurate data, and are unsupported by any facts.

The *Symptoms* of this form of hæmorrhage vary somewhat according to the exact situation of the placenta, and the period to which pregnancy has advanced. The first indication which the patient generally receives that something is wrong, is a sudden and altogether unaccountable discharge of blood, which is usually greater the nearer she has advanced to full time, and at first is unaccompanied by pain. The discharge will then as suddenly stop, to be again repeated probably in the course of a week or two. The first attack comes on generally about the middle or end of the eighth month. "The suddenness of the attack, the profuseness of the discharge, and its coming on without any evident cause, are peculiarly suspicious."

On examination the os is found to be thicker, softer, and more spongy, and the pulsation in its substance more strongly marked, than is the case in ordinary pregnancy with the placenta in its normal situation. All these signs are especially noticeable in the anterior lip.

The theory propounded by Dr. Barnes in explanation of the phenomena which occur in cases of placenta prævia is as follows: He divides the inner surface of the uterus into three zones or regions by two latitudinal circles: the upper region, which includes about one-third of the uterus, and to which he gives the name of the fundal zone, is the normal habitat of the placenta; the middle portion of the uterus, including rather more than another third of the uterine surface, he calls the meridional zone, "the region of lateral placenta," in which, though the placenta itself is not here liable to detachment previous to the occurrence of labor, yet its "attachment here may cause obliquity of the uterus, oblique position of the child, lingering labor, and disposes to retention of the placenta and post-partum hæmorrhage." Below this he places "the cervical zone, the region of dangerous placental attachment," on account of its liability to detachment before labor sets in. At the same time he controverts the notion that the hæmorrhage in cases of placenta prævia is due to the gradual growth and expansion of the cervix, and the consequent separation of the placenta in the later months of pregnancy. On the contrary, he affirms that the separation of the placenta and consequent hæmorrhage is due not to the growth of the cervix, but to the growth of the placenta. "The first detachment of placenta arises from an excess in rate of growth of the placenta over that of the cervix, a structure which was not designed for placental attachment, and which is not fitted to keep pace with the placenta. Hence loss of relation; hence placenta shoots beyond its site, and hæmorrhage results."

Again, in reference to what occurs at or about the time of labor, Dr. Barnes remarks: "The mouth of the womb *must* open to give passage to the child. This opening, which implies retraction or shortening of the cervical zone, is incompatible with the preservation of the adhesion of the placenta within its scope. In every other part of the womb there is an easy relation between the contractile limits of the muscular structure and that of the cohering placenta. Within the cervical region this is lost. The diminution in surface of the uterine tissue is in excess."

I have given at some length the opinions advanced by Dr. Barnes, because they seem to me to convey a truer explanation of the phenomena in question, and to rest upon a more sound physiological basis, than any hitherto advanced.

If the placenta be centrally attached, that is, directly over the os uteri, we shall be able to detect a thick, soft, irregular, spongy mass, blocking up the whole orifice, and having somewhat the feel of a blood-clot, but firmer and less friable; no other presenting part will be detected. If the placenta be partially presenting, the mass just described will be felt on one side only, its edge being clearly distinguishable, and at the same time the membranes, with probably some part of the child, will be felt on the other side. In some cases the placenta is so much on one side, and so high up, that its edge can only be reached after careful examination and passing the finger round within the internal os, a proceeding which should be resorted to only in cases of real emergency, as it is not altogether free from danger.

It is generally supposed that the later the time at which the bleeding begins, the greater the probability that the placenta is only partially presenting, because in these cases the bleeding is caused by the *commencing dilatation of the os;* whereas, if the hæmorrhage comes on *early*, the chances are that the placenta is centrally situate, the bleeding being due to the *gradual development of the lower portion of the uterus.* This can, however, only be regarded as a general rule, to which there are numerous exceptions, and, as I have already stated, the theory advanced by Dr. Barnes is to a great extent subversive of this view.

The flooding is always much more profuse when the patient has gone her full time. Sometimes nature intervenes to arrest this discharge, and this in several different ways; either coagula form and plug up the open mouths of the vessels, or the syncopal condition of the patient causes it to stop, only, however, to be renewed: in some very rare cases labor has been known to set in so violently that the child was driven forcibly through the placenta; this was afterwards expelled, thus terminating the labor very quickly, and at the same time stopping the discharge; in all these cases the child has been born dead.

Some cases are on record where the placenta has been separated and expelled before the birth of the child; and though complete separation of the placenta has been recommended, as will hereafter be stated, as the proper mode of treating cases of this description, yet it is an undoubted fact, which contrasts very unfavorably with this practice, that very many of the cases of spontaneous separation of the placenta before the birth of the child have ended fatally from excessive hæmorrhage.

The time at which the first attack of bleeding may come on varies a good deal, but it is seldom earlier than the sixth, and is much more common in the last month.

The *Treatment* of placenta prævia has at all times excited considerable attention; no doubt from the fact of its extreme importance, and the danger to which both the mother and child are exposed. Our treatment will depend much on the amount of the discharge, and the time at which it comes on, for our chief care at first is to arrest the discharge and to prevent expulsion; the latter, of course, is the more urgent the younger the fœtus. For this purpose the patient must be kept very quiet, cool, and in the recumbent posture; she should also avoid all occasion of excitement, and everything likely to hasten the circulation. It is very doubtful whether any good result can be obtained by the administration of drugs in circumstances such as we are considering. In ordinary cases of hæmorrhage I do not think there is anything so efficacious as the acetate of lead, given as before directed, with dilute acetic acid. Digitalis is also said to be a very valuable remedy, but I must own that though I have given it in many cases of uterine hæmorrhage, I have never seen any good result from it. Those who advocate its use say, that it should be given so as decidedly to affect the pulse, lowering its frequency and diminishing its force and volume; but this condition, of course, requires the most careful watching, and demands, moreover, a very close examination into the condition of the patient's heart, for in cases of organic lesion of that organ, especially fatty degeneration of the substance, or dilatation and thinning of its walls, fatal syncope may be easily induced. If the hæmorrhage be really the result of uterine action we might expect that opiates would be of great service in counteracting the tendency to uterine contraction; possibly also belladonna and conium, either applied locally to the cervix or given internally, might have a similarly beneficial effect, but I have never seen them used or heard of their employment for this purpose. Antispasmodics generally might also be thought to be of some service. Some advise the application of cold cloths, etc., to the vulva and lower part of the abdomen, but I have never been able to understand on what grounds, for certainly few remedies are more likely than this to excite uterine action, and yet this is just the very thing which we are taught to avoid. In the so-called *accidental* hæmorrhage this no doubt is of signal service, and for the very reason that it excites contraction, and thus closes the open vessels; if it were not for this it would be useless. Its mode of action is no doubt reflex. Its inapplicability to cases of placenta prævia, unless we are wanting to excite uterine action, is obvious.

In most cases the measures mentioned above will suffice to arrest the discharge when it occurs some time before the completion of gestation; but should they fail to do so, other steps must be taken, and these must depend upon the circumstances of the case. It may be laid down as a rule of general application, and one too which ought to be rigidly observed, that, no matter what the period of gestation, any large loss of blood demands the termination of pregnancy: for, to leave a patient to be subjected to another attack, coming on as it would do without any warning, is in truth to place her life in imminent danger. The only justifiable ground for a temporizing policy is the concurrence of the following conditions—that the discharge is slight, the period of pregnancy short of six months, the absence of pain, and an undilated os. If, on the contrary, the discharge is excessive, that alone justifies interference; and if at the same time there is pain, the result of uterine contraction, and the os is beginning to dilate, so much the better, as the chance of a speedy delivery is greater; but if the two latter conditions are not present the chief object of our treatment will be to secure them.

If the os be undilated the *plug* is the first thing to be tried, and if well applied, it is pretty certain to accomplish the object: we may then safely wait for time and uterine action to dilate the os. "We gain by its application important time—time that is essential for the successful delivery of the fœtus; for by it the woman's strength is preserved; pain is permitted to increase; and eventually, though tardily, the os uteri is dilated, the placenta and fœtus thrown off, and the flooding almost immediately controlled." (*Dewees.*) After a few hours more or less, according to the amount of uterine action, the plug may be removed, when possibly the bleeding will have stopped, and then, if labor be progressing satisfactorily, the case may be left to the natural efforts; or, if thought fit, the os being either dilated or soft and dilatable, the hand may be introduced, the child turned, and delivery be accomplished. Meanwhile the pressure of the child in its passage through the pelvis effectually stops all bleeding. Should the placenta not follow soon, it must be extracted, and great care should be taken to secure perfect uterine contraction by pressure, cold, or ergot if necessary. The utmost care is needed in performing this operation to avoid any injury to the cervix, for, as Dr. Rigby pointed out, its vessels in cases of placenta prævia are enormously enlarged, and the slightest laceration may be followed by very serious consequences. "A continued dribbling of blood has remained after labor, which has resisted every attempt to check it—the patient has gradually become exhausted, and at last died. On examination after death, Professor Naegele has invariably found the os uteri more or less torn."

Supposing, however, that uterine action is tardy, that the loss, though for the present controlled by the plug, has been severe, and seems disposed to recur when the plug is removed, we must resort to other means to expedite the labor; and the first step to be taken is to puncture the membranes. This may readily be done by means of a stilet, or a common hair-pin, or a piece of whalebone sharpened; after this, if oozing of blood goes on the plug should be reapplied, and to make it more effective, as well as to facilitate the labor, a bandage should be applied very firmly over the abdomen.

By these means we shall probably find that the labor progresses satisfactorily, the emptying of the uterus of the liquor amnii favors uterine action, the head or other presenting part descends, presses upon the open vessels, and so helps to arrest the hæmorrhage. But if these means fail, if the bleeding continues, if the uterine action is feeble, and the os dilates but slowly, two courses are open to us, either to turn and deliver at once, or, if that is impracticable, owing to the undilated state of the os, then dilatation must be secured by artificial means. For this purpose the dilating india-rubber bags should be employed; they possess the double advantage of dilating the os in a manner most nearly resembling that adopted by nature, and at the same time of arresting the hæmorrhage. We may use one bag after another, gradually increasing the size until the object is attained and the os is sufficiently dilated to enable us to turn, if that be necessary, or to apply the forceps, if that seems preferable; or if the bleeding is arrested, to allow nature to complete the delivery. Of course, if some part of the child presents other than the head, that must be treated in accordance with the rules already laid down in other parts of this work.

Sir James Simpson proposed another plan of treatment, namely, to separate the placenta entirely, and then leave the case to nature instead of turning the child. This practice was suggested by the belief that in those cases where the placenta was naturally expelled or detached before the birth of the child, a larger proportion of both mothers and children would be saved than in the ordinary operation of turning. It is not intended, however, that this proceeding should be adopted in all cases, but chiefly in those "most dangerous and difficult varieties of unavoidable hæmorrhage," where the patient is "in such an extreme state of exhaustion as to be unable, without immediate peril of life, to be submitted to the shock and dangers of turning or forcible delivery of the infant;" also where the child is dead, or where there is some obstacle to extraction.

It appears, however, that Sir James Simpson was not the first to propose this plan of treatment, for in 1822 Mr. Kinder Wood of Manchester strongly urged the same practice, and Dr. Charles

Clay states that he has "for nearly twenty years continued the same practice with almost entire success," and he now seldom resorts to any other mode of treatment when mechanical interference is necessary. He shows that by turning there is a mortality among mothers of about 1 in 3, and among children of 1 in 2; while in the practice of simply detaching the placenta from the cervix with the finger, the mortality among mothers is as 1 in 44, and among children 1 in 5; while "in nineteen cases out of twenty, the hæmorrhage ceases the moment detachment is effected. In my own practice," he adds, "I have never known it to fail," nor has he ever witnessed any bad consequences.

It is probable that no other practice has hitherto given such an amount of success, and yet notwithstanding this, there is a strong impression in the minds of many that it involves a good deal of risk. Dr. Churchill is evidently of this opinion, and he thus points out the cases and conditions in which this proceeding might be adopted: 1, in cases of great distortion, where turning would be impracticable, "it might facilitate the use of the perforator;" 2, in cases of extreme exhaustion, for the purpose of gaining time, the operation may be admissible, if the hæmorrhage really ceases after removal of the placenta; and lastly, "where the flooding is considerable, the presentation natural, and the pains strong, there seems to be no objection to arrest the hæmorrhage by the removal of the placenta."

A slight modification of this plan has been suggested by Dr. Barnes, who, dividing the uterus, as I have said, into three zones, recommends that so much of the placenta as lies within the cervical zone, *and no more*, should be separated; in this he designs to imitate the natural process, namely, the separation of the placenta from the cervix only, which always takes place during its dilatation by the process of parturition. Dr. Barnes, indeed, points out very properly, that where the placenta is attached chiefly in what he calls the meridional zone, with but a small part of it over the cervical zone, though this may be quite enough to give rise to very severe flooding, yet it is obvious that the finger could not reach nearly up to the upper attachments of the placenta, and therefore the plan recommended by Sir James Simpson could not possibly be carried out; but he maintains that if its attachments are freed from the cervical or orificial zone, then the hæmorrhage will cease, and labor may go on naturally to its completion.

POST-PARTUM HÆMORRHAGE.

It only remains, in connection with the subject of uterine hæmorrhage, to consider that form which occurs *after delivery* of the child, and which may arise either before or after the detachment and expulsion of the placenta. We may divide the cases of post-partum hæmorrhage into these two great groups, viz.: 1, those which occur before, and 2, those after, the expulsion of the placenta. In the former the hæmorrhage is the direct result of detachment of the placenta, the uterus not contracting properly to expel it. In the latter the uterus only is at fault. There may be retention of the placenta without hæmorrhage, but in that case there is no placental separation, for the great source of uterine hæmorrhage is the laceration of those large bloodvessels whose open orifices are exposed as soon as the placenta is detached, and which can only be closed, and the bleeding therefore arrested, by uterine contraction; this contraction may be hindered by the presence of the placenta or by other causes.

The *Causes* of retention of the placenta are various: some originate in the placenta itself, others in the uterus. The former give rise to morbid adhesion of the placenta to the uterine walls, chiefly through inflammatory action which may have dated from the very commencement of the pregnancy, or even before it. The latter induce a state of atony or of irregular and spasmodic action of the uterus, both alike being fatal to the expulsion of its contents.

Retention of the placenta from morbid adhesion may be *Diagnosed* by noting that though the uterus continues to contract after the birth of the child, yet the placenta does not descend, and at each such contraction there is a gush of blood more or less extensive. Some light may also be thrown on the case if there be a history of retained placenta in previous pregnancies. But the actual diagnosis can only be determined by a digital examination, when, on introducing the hand into the uterus and feeling for the edge of the placenta, it will be found still closely attached, and not movable by slight pressure of the mass itself. It will also be noted in these cases that when the uterus contracts it does not present that rounded form which occurs when the placenta lies loose in its cavity, but is irregular in outline, being more prominent in one part than another.

On the other hand, retention of the placenta, from causes situate in the uterus itself, will be diagnosed according to results. For instance, if it be due to atony of that organ, the uterus will be felt large and flabby, there will be an absence of uterine contraction and pain, and of the symptoms indicative of morbid adhesion: meanwhile hæmorrhage may be going on because a portion of the placenta, if not the whole, is detached. In such a case, by introducing the hand, the uterus will be felt in the condition described, but the placenta can readily be moved about in its cavity, and there is therefore evidently no morbid adhesion. If, on the contrary, the retention be due to irregular and spasmodic action of the uterus, we shall perhaps find the condition described as "hour-glass contraction," one which I have already considered (*vide* page 378). Here only a portion of the uterine fibres contract, while the others remain relaxed, and in the portion inclosed above the constriction, the placenta becomes, as it were, encysted.

Now, seeing that hæmorrhage in connection with retained placenta arises from a variety of causes, the *Treatment* must necessarily vary with the cause. In the case of retention from morbid adhesion of the placenta, the proper course to adopt is to introduce the hand and peel it off, in doing which the utmost caution is necessary; for, on the one hand, it is quite possible to do too much, and to inflict a grievous and even fatal injury upon the uterus; and, on the other hand, we may do too little, and by leaving portions of the placenta remaining, we may be answerable for its decomposition and for subsequent septicæmia. In introducing the hand, care should be taken not to injure the soft and perhaps bruised cervix; we should feel along the cord for the centre, and then for the edge of the placenta and gently pick or peel it off the uterine wall, taking care, if possible, not to allow any shreds to remain attached. During this operation the other hand should be kept on the fundus uteri outside, so as to steady the organ. In all cases of this kind we should give a guarded prognosis, for evil consequences are apt to arise even with the most careful, and in some cases we know that the adhesion is so intimate and firm that it is almost if not quite impossible to effect complete separation. For the first few days it is well to keep the vagina carefully syringed with Condy's solution, so as to prevent the evil effects of decomposition, should any portions have been left behind.

When the retention is due to atony of the uterus, our efforts should be directed to secure more efficient uterine action. For this purpose, ergot, cold, pressure, and galvanism or electricity in some form are the chief remedies to be tried before resorting to intrauterine extraction. Pressure may be applied with the hand grasping the fundus, and gently kneading it, and keeping up the pressure as long as may be. Cold may be applied in the form of cloths wrung out in cold or iced water and dashed suddenly on the abdomen and vulva. This is a most efficient remedy, and when combined with the former has very seldom failed in my hands. Every one must have often seen very fierce bleeding arrested in an instant by the simple application of cold in the manner stated. Cold water poured on the abdomen from a height, and iced water injected into the uterus, have also been tried with great success. If all these fail, then we may introduce the hand into the uterus for the purpose of exciting it to contract.

When it is known from previous experience that there is this tendency to flooding, a dose of ergot given immediately after the birth of the child will often suffice to prevent it.

In cases of hour-glass contraction we should endeavor by gentle but firm pressure of the fingers in the form of a cone to overcome the irregular spasm, and as soon as the hand is introduced, the placenta should be grasped and gradually withdrawn.

In all cases of hæmorrhage with retention of the placenta in which it is necessary to introduce the hand into the uterus for the purpose of removal, we should be especially careful, with one hand outside over the abdomen, to steady the uterus; and as the other hand is withdrawn, the uterus should be grasped externally so as to follow it down and thus secure firm and equable contraction.

There is yet one other form of post-partum hæmorrhage which I have to consider, and it is one which is often the most alarming and the most difficult to treat; it is the class of cases which occur after the expulsion of the placenta, and in which the principal cause is more or less complete atony and relaxation of the uterus. Very often this comes on quite insidiously; all may apparently have gone on well; the placenta has perhaps been expelled naturally, and some time afterwards the patient complains, perhaps, of feeling faint, and says that "something is running away from her." On examination there may be either a very slight discharge externally, or none at all, or it may be rushing away in torrents. There will be, of course, the general symptoms of loss of blood such as I have already described, and with more or less severity in proportion to the amount of loss. On examination we shall probably find that the uterus, which had been perhaps to all appearance firmly contracted, is now completely relaxed and greatly distended, reaching as high as, or even higher than, the umbilicus, tender to the touch, and indistinct in outline. Examined per vaginam we shall find the whole vagina and uterus filled with clots and fluid blood, which rushes away when the hand is introduced and the uterus makes a feeble attempt at contraction. It may be that the general symptoms are so severe as to indicate impending death; at any rate, there is no time to be lost, and we must be prepared at once with remedies, and with energy to put our measures into operation.

Treatment.—The first thing to do is to place the patient on her back, that being the most convenient position for what we have to do, as well as the best for the patient. Brandy should at once be poured down with an unsparing hand, watching for a moment its effect on the pulse. The uterus, at the same time, should be grasped firmly, and its contents, as soon as any reaction is established, be partly extruded by pressure, and partly drawn out by the hand in utero, which serves, at the same time, by contact with its walls, to excite contraction. If the uterus shows no sign of contracting, we should irritate it well by internal and external manipulation, and take care to clear it of all coagula. In some of the very worst cases of hæmorrhage that I have ever seen, the best results have attended this practice. I therefore strongly recommend it as one of the first and most important measures. Ergot may also be given at the same time, but I must own to great disappointment in the use of this drug under these circumstances, for I can hardly say that I have ever been sure of seeing really good results from it; in cases of extreme post-partum hæmorrhage, it may be, and I think is, due to the condition of anæmia, which seems to be proof almost against the action of this drug; still, I advise its administration as an additional aid. Cold, as I have already stated, is a valuable adjuvant in exciting uterine action: it may be applied either externally to the abdomen or vulva, or internally in the form of ice introduced quite within the uterus. As an outward application in the form of a douche or stream of cold water thrown on the abdomen from a height I have the greatest confidence in it; and I have also seen great good from a lump of ice introduced into the uterus.

Another agent which I have found of the greatest value in cases of this sort is galvanism, or electricity, in some form. I have used this many times, and I cannot call to mind a single case in which it has failed. The rotatory electro-magnetic machine is the form I have always employed, and which I recommend as being very portable, effective, and convenient. I always place one pole over the fundus and the other upon the perineum, and regulate the strength of the current according to the results.

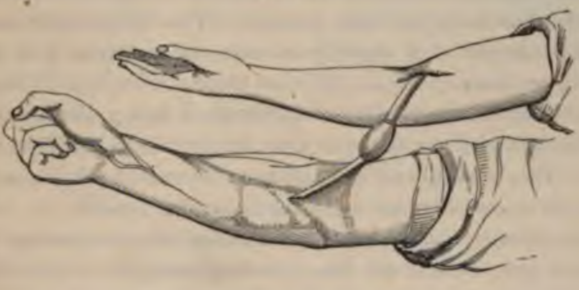
Supposing, however, that all these means fail, there is no time to be lost, and we must resort to the method recommended by Dr. Barnes of injecting the solution of perchloride of iron into the cavity of the uterus. For this purpose, the uterus must be completely cleared of all coagula, etc. An ordinary Higginson's syringe may be used, to which a uterine tube, eight or ten inches long, should be added. The solution to be injected should consist, according to Dr. Barnes, of four ounces of the Liquor Ferri Perchloridi Fortior of the British Pharmacopœia with twelve ounces of water, and in throwing it up great care should be taken not to inject air at the same time; it should be sent quite up to the fundus uteri, but slowly and gradually. As yet I have never had occasion to use this remedy, and I must own that I shrink from resorting to it, while recognizing fully the great weight of authority which has been adduced in favor of it, because I cannot doubt that it is a remedy the use of which is not altogether free from danger. Moreover, though I have seen some very frightful cases of post-partum hæmorrhage, I have never hitherto failed with the means already described, and certainly I have never yet seen, either in consultation or in my own practice, a single fatal case of post-partum hæmorrhage. Still I am bound to say that there is a continually increasing weight of evidence in favor of the proposal, and in very desperate cases I can well imagine that it may be successful. But, on the other hand, in several cases that I have heard of, evil consequences have ensued, whether as the direct result of the remedy or not I cannot tell, but the coincidences are at least suspicious. Phlegmasia dolens occurred in two cases, and one physician of large experience in the provinces, who has used it several times, writes to me: "In all there were present, for a week or nine days after, violent and continuous after-pains, intense uterine irritability and tenderness, quick pulse, thirst, etc. For more than a week little black clots every now and then were found in the napkins. The severe after-pains and tenderness of the uterus are due probably to the violent efforts of the uterus to expel the clots, which from the action of the perchloride are so firm and adhere so tenaciously to the lining membrane of the sinuses, that the uterus is unable to expel them for many days. In the last case I had, these symptoms were not present, and the patient recovered as well as usual; but in this instance I put so little of the solution of the perchloride that the surgeon who was in attendance did not think it would be of any use. A very small quantity of the perchloride in the water ought to be sufficient to coagulate the blood in the sinuses, so as to cause the clots to act as a barrier to the escape of blood, and yet be expelled within a reasonable time after the arrest of the loss, and by moderate contractions of the uterus."

TRANSFUSION.

A few words must here be added on the subject of *Transfusion*, an operation which, though beset with difficulties and by no means free from danger, has undoubtedly been the means of saving many lives, and ought to save very many more. Of course, it is only in the most extreme cases that this proceeding would be resorted to, but the principle is sound enough, that where a person is dying simply from loss of blood, the pouring into her veins of a given quantity of that fluid to take the place of that which is withdrawn is the only proper remedy. The questions arise, how is it to be done? what method shall we adopt? what instruments are the best? and what fluid shall we use?

As to the method of operating. We may either introduce the blood directly from the vein of the person supplying it by some connecting tube, or we may collect the blood in a vessel prepared for the purpose, and afterwards inject it into the veins of the patient. Both these methods have been extolled by their respective advocates. For the former method, Dr. Aveling's or Dr. Playfair's are, I think, the simplest and best instruments; that of Dr. Aveling is represented in the annexed illustration, Fig. 145; it consists of a small india-rubber tube, having a silver canula at each end; the centre of the tube is somewhat dilated, and may be used by compression to force on the blood if it flows too slowly; one end of this tube is inserted into the vein of the person giving the blood, the other into that of the patient—the median basilic vein being the one selected in both cases, and the blood is allowed to flow through as long as may seem necessary. It is found, as a rule, that from six to eight ounces is generally sufficient, but in this respect we must be guided entirely by the circumstances of the patient.

FIG. 145.



When the indirect method is resorted to, the chief difficulty lies in the coagulation of the blood; hence various methods of operating to avoid this result. Either we may defibrinate the blood or we may add something to prevent or retard coagulation. Dr. Richardson recommends a few drops of ammonia, Dr. Braxton Hicks a little phosphate of soda; either is free from objection and generally successful. The defibrinating method is on the whole, perhaps, not quite so satisfactory, but still it is one which has been adopted with success on many occasions. If we use blood prepared after the method of Hicks or Richardson, we must have some vessel in which to receive it, and a syringe with which to inject it into the vein of the patient. Dr. Richardson has a very nice apparatus for the purpose; he draws the blood from the arm with a glass syringe, into which for every ounce of blood three drops of ammonia are added, then it is injected into the patient. There are several other methods, but I think this is the best.

If we resort to defibrination, the blood must first be drawn into a vessel, then well beaten with a stick so as to catch the fibrin, after which it may be filtered through muslin, and then injected with a syringe. The blood-corpuscles and the liquor sanguinis are the essential ingredients to be used. Some authorities, arguing from the analogy of cholera injections, have recommended the employment of saline and alcoholic solutions in place of blood, but I know no valid reason for the preference.

In performing the operation, we should be careful first to dissect out the veins in both persons. The instruments we use should be dipped in a slightly ammoniacal solution, four or five drops to an ounce, and in the case of Dr. Aveling's instrument the tube should be filled with it, the fluid being displaced only when the blood from the one arm drives it into the vein of the other. This prevents air passing into the vein; and this is essential in all cases where an injecting apparatus is used.

But supposing that blood is not obtainable, then we ought certainly to give the patient the chance of using a saline solution, after the manner recommended in cases of collapse from cholera. The following is the solution recommended by Mr. Little for that purpose: 60 grains of chloride of sodium, 6 grains of chloride of potassium, 3 grains of phosphate of soda, and 20 grains of carbonate of soda, dissolved in 20 ounces of distilled water, at a temperature of about 98°; this solution may be still further improved by the addition of two drachms of alcohol.

The following case, so graphically described by Dr. Beatty, illustrates so well the difficulties which attend the operation of transfusion, and at the same time shows how they may be overcome, that I may be pardoned for reciting it at some length. The patient is stated to have been in such a deplorable condition, that "she was thought to have only a few minutes to live, and accordingly the operation for transfusion was decided upon." "Her husband readily offered to furnish the blood, and about six ounces were drawn from his arm by Dr. R. McDonnell. This, as it flowed into a common bowl, was agitated briskly with a glass rod, in order to separate the fibrin; and the agitation was kept up until the full quantity had been drawn, and for some minutes after, when a large coagulation of fibrin adhered to the glass rod. During all this time the bowl was kept floating in a basin of hot water. The blood was then strained through a muslin cloth, and all the fibrin was thus separated. All this was done in the parlor, and the blood thus prepared was carried up to the patient's bedroom. The difficulty of the operation now commenced. The patient was as a corpse, bloodless; there was no trace of a vein to be found in her arm. A ligature tied round above the elbow showed nothing. By feeling cautiously, what we imagined to be a vein was perceived. Dr. McDonnell, who performed this operation with that skill, coolness, and dexterity for which he is remarkable, now adopted the expedient of pinching up a fold of skin at the bend of the arm, and then running a narrow bistoury through it, slit it up, leaving a wide gaping wound in the skin, which displayed the veins at the bottom, resembling flat dead earthworms. The median basilic appeared to be the largest, and under this he passed a long acupressure needle, so as to elevate the vein, and prevent it escaping during the remaining steps of the operation. The difficulty now was to open this small, flat, empty vein without transfixing it. This he most dextrously accomplished by means of a fine-pointed pair of forceps, with which he seized the anterior coat of the vein, and then with a fine tenotomy knife, the back of which was kept in contact with the vein, he slit up above the point at which it was crossed by the subjacent needle. The bowl of blood (which, during this necessarily tedious proceeding, had been kept floating in hot water) was now brought to the bedside. The injecting apparatus was of the simplest construction. A common brass enema syringe that holds two ounces, such as is used for self-administration, was fitted with a fine india-rubber tube, coming off from the side. This was about a foot long, and terminated in a fine glass tube four inches long, running to a fine point at its extremity; the glass tube was used in order to facilitate the detection of any bubble of air, if such should gain entrance into the apparatus. I held the bowl containing the blood with my left hand, and with my right I held the brass syringe standing upright in the blood, and keeping the lower end of it well pressed to the bottom, so as to prevent the possibility of any air gaining access to the interior. Mr. Collis worked the piston slowly and cautiously. The instrument was filled with blood till it ran out at the nozzle, and Dr. McDonnell proceeded to introduce the glass tube into the vein; but this was very difficult to effect, for although a very sufficient opening had been made into the vein, it was so flat and collapsed that some time elapsed before he could accomplish his object. At length he succeeded, and Mr. Collis urged the blood forward by lowering the piston. About six or seven ounces of blood were thus poured into the system of the patient. It was intensely interesting to watch the effect produced by the introduction of this vital fluid. The first change I noticed was the improvement in respiration; the long, labored, gasping, sighing effort that had been so distressing to witness became more calm, and like what natural respiration should be. This began to appear when about half the quantity of blood had been injected. The countenance became less ghastly, and imminent death seemed warded off when the last portion of blood had entered her vein." From this time onward the patient made a good recovery.

In his concluding remarks Dr. Beatty observes: "A most important point, in the history of this case, is the simplicity of the apparatus with which it was performed. A few shillings would cover the entire cost. Like many other highly important operations success is all in the using, not in the costliness of the tools. It serves to show that there is no such difficulty in safely performing transfusion as we have been led to imagine, but that when the principles which should govern the operator are fully comprehended, it rests upon his dexterity and skill to carry them out, and not upon a complicated and unwieldy piece of machinery. Dr. McDonnell accomplished with his simple apparatus what others, possessed of elaborate machines, have failed in achieving. This example of what may be done by good brains and skilful hands will, I hope, induce others to undertake the operation of transfusion, but not without a full knowledge of the essential points to be looked to and avoided. In reading the history of the operation just detailed these points will all appear, and I will not prolong the communication by their repetition."

Before concluding the subject of hæmorrhage, there is one form of it, due probably to accidental separation of the placenta before complete delivery, which, when it occurs, gives rise often to most alarming symptoms and may be a source of great embarrassment to the practitioner. I allude to the hæmorrhage which occurs in cases of presentations of the lower extremities just before the delivery of the head when the rest of the body is born. What makes these cases the more alarming is, that they generally arise where there is difficulty in extracting the head, so that the bleeding goes on into the uterine cavity, the latter being easily distended because it has hardly yet had time to contract down firmly. I have seen but one case of this kind, and in that the loss was so great and the condition of the patient so alarming, that I was obliged in order to rescue her, to destroy the child by perforating the head, which I did behind the ear, and so completed the delivery. It was doubtful in this case whether the child was alive when I used the perforator, for the body had been born some minutes, the head being detained at the brim, and consequently pressing upon the cord; still probably resuscitation would have been possible had not the flooding rendered immediate delivery absolutely necessary. My friend the late Dr. Lumley Earle gave me an account of two severe cases of this kind that he had met with, and doubtless there have been many such. In one, he told me, the surgeon in attendance finding he could not extract the head, left the house to get a perforator (there was no hæmorrhage up to this time), but when Dr. Earle entered the room he found the patient in a condition evidently betokening that internal hæmorrhage was going on, she was blanched and faint, and the uterus was much too large, reaching above the umbilicus.

In these cases it may be that little or no blood appears externally, but the patient presents all the appearance of internal bleeding, and the uterus by its size and soft feeling gives evidence of what is going on. Prompt action is urgently necessary, and this should consist, first, of firm and equable pressure by means of a bandage over the uterus, so as to prevent its further distension; and secondly, delivery should be accomplished with as little delay as possible, even if the perforator has to be used. When the child is born the placenta should be at once removed, and the uterus should be emptied of its bloody contents. The subsequent management of the case will be the same as for post-partum hæmorrhage after the expulsion of the placenta.

CHAPTER III.

PUERPERAL CONVULSIONS.

There are few conditions incidental to the puerperal state more terrible in their external manifestations, or more fatal in their consequences, than convulsions. Much discussion has taken place both as to the causes, the nature, and the treatment of this disease. Properly speaking, perhaps, there is but one form of convulsion which should be called strictly *puerperal*, inasmuch as it alone is peculiar to the puerperal state, though that may originate in many different ways. The other forms, namely, the hysterical and the apoplectic, may occur at any time, and they have little or nothing to do directly with the state of pregnancy. At the same time it is very important, seeing that these require very different treatment, and justify a different prognosis, that we should be able thoroughly to distinguish between the three varieties of convulsions, and a description of each will therefore be given in this place. The two latter may, I think, fitly be considered first, in order to clear the way for a better appreciation of the leading characteristics of the former.

HYSTERICAL PUERPERAL CONVULSIONS.

This form of puerperal convulsions seldom occurs during the course of labor, but is most common in the last few weeks of gestation. It may also occur after labor, "especially when the milk is coming on," and it occasionally happens in the earlier weeks of pregnancy. Hysterical convulsions occur, of course most frequently in nervous and hysterical subjects, and may be brought about by mental emotion, by disordered digestion, by over-anxiety, fatigue, or other depressing cause. It is seldom or never fatal, and rarely productive of any evil consequences either to the mother or the child, though in very exceptional cases abortion or premature labor has been known to take place.

The Symptoms.—Most of the patients in whom these convulsions occur have the nervous hysterical peculiarities very strongly marked. They are generally young, often highly intellectual and refined, and at this time are very nervous and anxious about their condition. They easily start at noises, and readily give way to crying; they are cross and fretful, wakeful at night, and very sensitive to pain: if an examination is necessary, they will shrink from it with great aversion, call out at the slightest touch, and resist as far as possible any attempt that may be made in this direction.

Among other indications, there is also a frequent desire to pass water, partly from a nervous inability to retain it, and partly from the secretion being more than usually abundant; it is also observed to be very pale, and of low specific gravity. The bowels are habitually confined, and the patient is subject to globus, to alternate fits of crying, laughing, or singing; with frequent sighs, difficulty of breathing, and neuralgia in various parts, but mostly of transient duration.

When a fit is impending, there is increased nervous irritability, frequent globus, sobbing, and a large increase in the quantity of urine secreted. This last is sometimes a very certain indication. Not less marked are the peculiarities of the fit itself. Unlike that which occurs in the true puerperal convulsions, it is in the larger muscles of the trunk and extremities, and not the smaller muscles, that the convulsive movements occur. The face is sometimes pale, but the muscles there are unaffected by the spasm. The patient throws herself about, and sometimes goes into a state of opisthotonos; this has been regarded by some as quite pathognomonic, for it seldom or never occurs in the true puerperal convulsions, and never in the apoplectic. There is no foaming at the mouth or biting the tongue as in true epilepsy; if the eyelid is raised, it is often closed directly, as if by the patient's will. There is evidently no decided insensibility; and though the patient screams violently, a dash of cold water will often suffice to restore tranquillity, and is certain to produce reflex phenomena, which do not take place in genuine epilepsy. "We hold the effects of cold water to be one of the best diagnostics of the disease from epilepsy, in which the patient is entirely insensible to such impressions" (*Rigby*). Very often a good splash of cold water over the face and chest will completely restore the patient.

If labor is going on, the patient winces at every pain, and resists examination. The pains are more like spurious pains, irregular, often very rapid, and apparently severe; no doubt this is from over-sensibility on the part of the patient.

The *Diagnosis* is not generally difficult. The previous history and constitution of the patient, the evidence of sensibility, the absence of any foaming at the mouth, of biting the tongue, of twitching of the smaller muscles, of stertorous breathing, and the effect of cold water, are sufficient to guide us pretty certainly to a correct opinion; and this will be confirmed as soon as the patient comes out of the fit, by her being again perfectly well, without any paralysis or other indication of nervous lesion.

The *Treatment* consists chiefly in the administration of antispasmodics, valerian, assafœtida, ammonia, sulphuric ether, and tonics, with aperients, the bowels being generally deranged; the shower-bath, and general hygienic and moral measures. During the fit, cold water splashes and ammonia to the nostrils will be of service. As far as the labor itself is concerned, there is no necessity for interference; the case may in that respect be left to itself.

APOPLECTIC PUERPERAL CONVULSIONS.

Though the convulsions which sometimes take place during an apoplectic seizure may occur before, during, or after labor, and possibly may be in some way brought about by that condition, they are nevertheless identical with apoplexy occurring at any other time, and only need, therefore, to be studied for the purpose of showing the contrast between them and the other varieties of convulsion.

The *Symptoms* observable before the fit, when any such occur, which is not always the case, are a flushed and often an anxious expression of countenance, with suffusion of the eyes, very frequently pain in the head and throbbing in the temples. Sometimes, however, there are no premonitory symptoms whatever; the fit comes on with, perhaps, but not always, slight twitching of the muscles, and, for a moment, jactitation of the limbs; this soon passes off, however, and either immediately or gradually the patient falls into a state of stupor, with stertorous breathing, more or less complete insensibility, and paralysis either of one or both sides. The pupils will be found dilated in some, contracted in others, and always insensible. The pulse is full and slow, there is no foaming at the mouth, no biting of the tongue, and no screaming. The insensibility may last for a variable period, and end in one of three ways—either the patient recovers completely after a certain time; or consciousness returns, but paralysis of part or the whole of one or both sides of the body remains; or lastly, the coma may continue for some time, and ultimately end in death.

The *Treatment* will be the same as for apoplexy under ordinary circumstances. As the symptoms are caused by a hæmorrhage within the cranium, either upon the surface or within the substance of the brain, induced by a rupture of some vessel from overdistension, the result of simple congestion of the brain, the idea of relieving such distension or congestion by venesection naturally arises; and we are advised sometimes to carry the depletion to such an extent as to produce a sensible effect on the consciousness of the patient. Occasionally, however, in cases of sanguineous effusion of large extent, no effect whatever, at least no good effect, is obtainable by this remedy. After the bleeding, cold should be applied to the head, the hair should be removed, and the rest of the treatment will consist in the free administration of purgatives and the application of blisters to the head and neck.

If labor is in progress, delivery should be accomplished as speedily as possible by the application of the forceps, if that is practicable. In some cases turning may be the proper proceeding; and in any case delivery ought to be effected.

PUERPERAL CONVULSIONS.

Epileptic puerperal convulsions, as these are sometimes called, are much more common than either of the other forms of convulsions. They are said to occur about once in six hundred labors, and about one-fourth of the cases are stated to end fatally, or, to put it more exactly, from the figures of Dr. Churchill, it appears that in 228,010 cases of labor, 373 were complicated with this variety of convulsion, or about 1 in 614; and, out of 354 cases, 75 mothers died, or about 1 in 4½. They are more common with primiparæ than multiparæ.

The *Causes* assigned for this condition are very various; they may be enumerated as follows: 1. Special irritability of the nervous system; 2. Irritation in some distant part of the body, especially the uterus, or the digestive organs, accompanied by a morbid sensitiveness of the nervous centres; 3. Congestion of the brain or spinal cord, or both; 4. Sudden and violent mental emotion; 5. Morbid irritation of the uterus from the presence of too much or too little blood. Dr. Tyler Smith observes, in application of the theory of reflex action promulgated by the late Marshall Hall, "The true puerperal convulsion can only occur when the central organ of this system, the *spinal marrow*, has been acted on by an excited condition of an important class of its incident nerves, namely, those passing from the uterine organs to the spinal centre; such excitement depending on pregnancy, labor, or the puerperal state." In this way he shows that convulsions may be brought about by causes acting either directly on the spinal marrow, *centrically;* or indirectly *excentrically*, by an irritation affecting the extremities of the incident nerves; and these two classes he arranges in the following manner:

I. *Causes acting immediately on the Central Organ.*

1. Pressure exerted on the medulla oblongata by congestion, coagula, serous effusion within the cranium.
2. Loss of blood.
3. Morbid elements in the blood.
4. The influence of emotion.

II. *Causes acting on the Extremities of Excitor Nerves.*

1. Irritation of the incident spinal nerves of the uterus and uterine passages.
2. Irritation of excitor nerves within the cranium.
3. Irritation of the incident spinal nerves of the rectum.
4. Irritation of the ovarian nerves.
5. Irritation of the gastric and intestinal branches of the pneumogastric nerves.
6. Irritation of the incident spinal nerves of the bladder.
7. As probable causes may be enumerated, irritation of the cutaneous nerves of the mammæ, or of the hepatic and renal branches of the pueumogastric nerve.

A remarkable relation appears to exist between albuminuria and dropsy and puerperal convulsions; but how far these two conditions are related as cause and effect it is difficult to determine; some suppose that the condition of the urine is simply the result of reflex irritation starting from the uterus, and that the convulsions are brought about in the same way; others believe that the albuminuria is the result merely of pressure on the kidney, and that the convulsions have no relation to this condition of the urine; while others, again, regard both conditions as due to "a pathological state of the blood, to the occurrence of which pregnancy may some way dispose." It is very doubtful whether either of these opinions be true, while it is certain that albuminuria often exists without convulsions: I have seen several cases of this kind myself. On the other hand, convulsions may occur without any preceding albuminuria. The same may also be said in regard to anasarca, which has no necessary connection either with convulsions or with albuminuria. In cases where albuminuria exists the urine is found also to contain less than its normal amount of urea, while the blood has it in excess; hence it has been surmised that the convulsions resulted from the influence of the uræmic poisoning on the central nervous system. The German observers, Frerichs and Lehmann, on the other hand, believe that it is not the urea itself, but its decomposition in the blood, and the formation there of carbonate of ammonia, which can undoubtedly be detected in the breath and perspiration, that is the chief cause of the convulsion.

It is interesting to note in reference to this question that the presence of sugar prevents the decomposition of urea into carbonate of ammonia; this fact is made use of to explain the beneficial effect which not infrequently follows the use of chloroform in these cases: for it is well known that the administration of chloroform to complete narcosis is often followed by the presence of sugar in the urine, and it is inferred that the sugar exists primarily in the blood, whence it is secreted by the kidneys. Whether this explanation be sound or not, as applied to the facts of the case, is perhaps doubtful, but of the facts themselves there is certainly no question.

Dr. Rigby thought that there was no difference between this disease and common epilepsy, beyond that, under ordinary circumstances, epilepsy is a chronic affection, and, generally speaking, not attended with much danger; whereas, in the present case, it is an acute attack, and of a very dangerous character. Speaking of "the intimate nature of the consent existing between the brain and the uterus," he remarked upon the occurrence, occasionally, of strange cerebral symptoms in connection with disordered menstruation, and also during labor at the time of full dilatation of the os, or after the birth of the child. "The patient is frequently sei with a sudden convulsive rigor, so violent as to make her tee chatter and agitate the whole bed, and which is nothing mo than a harmless modification of convulsive action arising fro uterine irritation."

It is stated by some, that persons who are epileptic are much more liable than others to puerperal convulsions. It does not appear, however, from a large number of cases, that such is the result of experience. Out of 51 pregnancies which occurred in 15 epileptic subjects, 2 only had puerperal convulsions.

The *symptoms* usually commence with certain premonitory signs indicative of cerebral congestion, but there is seldom or never any distinct "aura." There is redness of the face and conjunctivæ, throbbing pain in the temples, vertigo, muscæ volitantes, tinnitus aurium, temporary dimness of vision and loss of consciousness, occasional nausea and shivering; in some, a severe pain at the back of the head; in others, in the stomach and præcordia, precedes the attack. These symptoms increase in severity as the fit comes on, the pulse becomes very small and quick, the patient stares about in a vacant manner, rolls her eyes from side to side, and throws her arms about; then the eyes become fixed, and she lapses into a state of coma, quickly followed by severe convulsive seizures. In some cases there is no warning whatever, nor any premonitory symptoms; but the convulsions come on suddenly while the patient is perhaps engaged in ordinary conversation.

The convulsive movements generally begin in the muscles of the face and neck, the tongue is protruded and violently bitten, blood is mixed with the foam which issues from the mouth, the face becomes swollen and purple. The muscles of the trunk and extremities are afterwards affected, the movements of the chest are impeded, respiration is labored and accompanied with a curious hissing noise, caused partly by spasm of the glottis, and partly by narrowing of the trachea from spasm of the surrounding muscles; the contents of the bladder and rectum are voided unconsciously; the whole body and limbs may be thrown into violent contortions, a profuse perspiration breaks out, and in this state the patient may continue for a variable period, when the symptoms gradually subside; first, by a diminution of the convulsions, with relaxation of the spasm of the respiratory muscles; the pulse, which had before been quick and hard, now becomes soft and quiet; the swelling and congestion of the face disappear, the tongue is withdrawn, the foaming at the mouth ceases; the eyes, before fixed, again begin to roll about and to take some cognizance of surrounding objects; gradually consciousness returns, or the patient falls into a profound but apparently comfortable sleep.

In this state she may remain for some time, when she gradually wakes to consciousness, and beyond feeling perhaps a little stiff and sore about the muscles, with some confusion of mind and, of course, soreness of the tongue when that organ has been bitten, she is in perfect ignorance of everything that has taken place. There may or may not be any recurrence of the fit; if there be, the interval which elapses may be of long or short duration, during which time the patient may either be quite conscious, but very weak and prostrate, or dull and comatose; there may be only one other fit, followed by recovery, or the fits may recur with intervals of long or short duration for many hours.

Sometimes a great difference in the character of the fit, according to the cause, may be observed: thus, when the patient is in a state of plethora, the fits are more of an apoplectic character, the coma is more profound, the cerebral affection more severe, and after the fits there is occasionally imbecility and blindness, which may last for hours, days, or even longer. On the other hand, when disordered bowels have been the cause, there is very often marked delirium amounting almost to mania. The cerebral congestion is not so intense, and the coma is less profound, while instead of a state of stupor, there is a restless unmanageableness approaching to maniacal excitement. This may last only a few hours, or it may remain for many months. It has been noticed by some observers that puerperal convulsions happen more frequently towards evening, but I question the fact, and certainly can offer no explanation of it.

The fits may occur either before, during, or after labor; but as a rule they are more liable to occur the nearer the patient is to full time. Sometimes they are the immediate exciting cause of labor, and whether as a consequence or not, it happens that about one-third of the children are still-born. It has been thought by some that the convulsions might be a consequence of the presence of a dead child in utero acting there as a foreign body, but there is no ground for supposing that a dead child is more of a foreign body than a living one; still less that either has any influence of the kind suggested.

In most cases the character and progress of the labor are in no way affected by these attacks; very often each return of pain brings with it a fresh convulsive seizure, and in a few cases it has been noted that (whether it is from the uterus partaking in the more violent character of the clonic spasm or not) the labor is much more quickly terminated; sometimes, indeed, the child has been born before it was known that labor had begun. Denman observed that patients who had suffered in this way were more liable to abdominal inflammation afterwards.

It is more rare to meet with convulsions *after* delivery, and it is by no means clear to what cause they are then owing. They do not appear to have any connection with the character of the labor, for they occur after labors of all kinds, but it is probably connected with some state of nervous excitability left by the parturient act.

Prognosis.—The danger from this disease is beyond doubt great, but though the mortality is still high, it is very much less than formerly. The great majority of cases happily recover; though, as has been shown already, nearly one-fourth of them end fatally. The prognosis, however, should at all times be a guarded one; and to some extent it will be guided by the severity of the fit, its duration, and, if it recurs, the frequency of such recurrence, and the shortness of the interval. According to Dr. Hall Davis, "If the patient lies long in a state of complete stupor, with stertorous breathing after the paroxysm, even although the fits might be of short duration, we should consider her in greater danger than if the convulsions were stronger, with a return to perfect consciousness between the fits. As a rule, those which occur before or during labor are more dangerous than those which follow labor."

The mortality of the children is far greater than that of the mothers; the lowest estimate places it at about one-third. The cause of this high death-rate is probably due partly to the violent uterine contractions which occur during the fit, but chiefly to the blood poisoning, which the child receives through the mother, and which may prove fatal by uræmic convulsions even after its birth.

The *Treatment* of this affection should, if possible, be begun before the fit actually occurs; this, of course, can only be carried out when there are premonitory symptoms, which unfortunately is not always the case. Suspicion should, however, be aroused when there is, in the latter months of gestation, dropsical swelling in any part of the body, with albuminous urine; also when the patient makes complaint of headache, giddiness, noises in the ears, flushings of the face, or other indications of cerebral congestion. For such a condition nothing is so likely to be of service as pretty free purgation with saline aperients; it may be kept up steadily, though not so as to depress overmuch, until labor is completed. Some advise bleeding: I believe purgation is equally effective and less objectionable, unless there is great urgency. Benzoic and acetic acids have also been recommended, while some advise diaphoretics, a warm bath, etc. Diuretics are inapplicable.

When the fit has set in, the treatment must be governed by the condition of the patient, and the stage to which labor has advanced. Our first care is in all cases to see that the patient does not injure herself; with this object in view, supposing the fit to occur before or during labor, the patient should be placed on a bed; if possible, a cork should be put between her jaws, so as to prevent the tongue being bitten.

The treatment advised by most authorities used to be the old routine plan of bleeding, blistering, and purging. It is remarkable how uniformly, and in cases the most diverse, this practice was recommended. Thus we were, and indeed by some are still told, that the first thing to be done in puerperal convulsions is to bleed freely, so as to produce a decided effect on the pulse, and, if possible, also on the fit itself; ten, twenty, thirty, and even fifty ounces of blood were recommended to be drawn. Should this not succeed, the next remedy was purging; calomel and jalap, or any other drug certain to produce a decidedly cathartic action, was to be given. There is far less objection to this proceeding than to bleeding; its beneficial effect is supposed to be due not so much to the drain produced on the bowels, as to the revulsive or counter-irritative action excited. Those drugs, therefore, are preferable which have a more or less irritative action, such as aloes, jalap, gamboge, scammony, or colocynth. These are not likely to produce the mischief which calomel does; they should be given as soon as possible; and if the case seems to require it, as where there is a continuance of cerebral disturbance, purgation may be kept up for a time by repeated doses of the same drug.

Most writers are agreed as to the efficacy of purgation; and as the disease is often very intimately associated with a confined or otherwise disordered state of bowels, the rationale of the plan is readily understood. It has often been noticed that purgation has produced a much more decided effect than venesection.

Shaving the head, and applying cold, will sometimes be of service. A warm bath has been recommended, but its value seems very questionable, while there are many objections to it, not the least of which is the extreme awkwardness of placing a person in a fit into a hot bath, especially if labor is going on. Mustard poultices to the legs, or a hot mustard foot-bath, are more convenient of application and very often more useful.

Opium and tartar emetic, combined or separate, have been recommended. The former drug is often of signal service "when the fits continue after delivery," and also when, after other treatment, the fits are beginning to abate. Lately, the hydrate of chloral has been given, and with good results, as shown by a case recorded in the *Practitioner* for March, 1870, by Mr. Hay. The patient was delivered at 7.30 A.M., and at 12.30 P.M. was seized with violent convulsions, and continued having three or four attacks every hour, each increasing in severity, till 7 P.M., when she was given 60 grains of hydrate of chloral, which produced some sleep; but she awoke to have another attack, and 30 grains more were given, after which she had no more attacks and recovered perfectly.

The condition of the bladder requires special attention, for it has happened on several occasions that, on introducing a catheter, a considerable quantity of urine has been drawn off, with almost immediate relief from the fits; so great, indeed, has been the improvement that it has led to the belief that the fit was entirely due to retention of urine.

Of late years a very different kind of treatment has been suggested, and so far the success which has attended it has been most marked. I allude to the employment of anæsthetics. Both before and during labor the convulsions have been completely quelled by administering ether or chloroform, so as to produce complete insensibility. In some cases it has been necessary to keep up the influence of the remedy for many hours, or even days, almost without intermission, yet no evil effects have been noted; labor has gone on, and been terminated, the patient being quite insensible; and on recovering consciousness all symptoms of the fits have passed away, and no recurrence has happened. It need scarcely be said that a remedy of this kind can only be given with safety by the medical attendant, especially when its continuance for so long a time may be necessary, and care should be taken to watch its effect upon the pulse, as the giving so large a quantity is not without some danger of inducing paralysis of the heart.

Hitherto only the treatment necessary for the convulsion, irrespective of the progress of the labor, has been considered. Nor until labor has begun, and advanced to full dilatation of the os, should any attempt be made to expedite delivery. The old practice of forcibly dilating the os, for the purpose of effecting speedy delivery, is now happily exploded, for the consequences of such a proceeding could not be otherwise than mischievous. But as soon as the os uteri is sufficiently dilated, or so far dilatable as to admit of easy delivery, "no doubt it ought to be performed with all prudent expedition, as you can never be sure of her being restored without delivery" (*Mackenzie's Lectures*). There is, indeed, little or no chance of the convulsion ceasing so long as the child remains in the uterus, with probably the head pressing upon a tender and irritable cervix; but no sooner is delivery accomplished than, as a general rule at least, the fit subsides; it may, of course, recur, but the patient's chances of recovery are decidedly better after delivery than before.

The question as to what should be done, how quickest and best to accomplish delivery, with safety to both mother and child, is a point which has attracted considerable attention, the doubt being as to whether turning or the forceps is best. For my own part, I have no hesitation in advising the latter. Of course the state of the parts is equally important in both cases; but, considering the danger to the child in version, and that the forceps may be applied with equal facility and with far less of fœtal risk, while the risk to the mother is about equal in both cases, the preference for the forceps is easily understood. Chloroform materially contributes to the success of this operation.

If the parts are undilated and unyielding, the measures for securing dilatation should be had recourse to, as in the case of rigidity of the os uteri; and no attempt at delivery should be made until the parts are sufficiently dilated to admit of it. Neglect of this precaution can only serve to increase the irritation, and consequently the convulsions, and may, indeed, induce a fatal issue.

Another question now arises—supposing that the convulsions are of extreme severity, that the uterus is firmly and rigidly contracted, yet the child makes no descent, and all attempts to effect delivery by the forceps or turning only seems to aggravate the mischief, while the patient is becoming more seriously exhausted. What can be done? It is clear that nothing short of delivery can save the patient; and statistics prove that in such severe cases the chances are more than equal that the child will be still-born. The obstetric rule, therefore, is, to accomplish delivery in the quickest possible manner, and thus, as far as possible, to diminish the irritation which is keeping up the convulsions; this is only to be done by performing craniotomy; and though this has often been objected to, there can be no doubt that it gives the best chance to the mother, and is, therefore, to be preferred to any other treatment in cases of the kind now under notice.

The subsequent treatment consists in keeping the patient quiet; the room should be darkened, the head kept cool, and sedatives should be administered; of these, chloral is, perhaps, the best, given in doses of fifteen or twenty grains, and repeated every four, six, or eight hours; the Liquor Opii Sedativus is also most valuable. The bowels must be kept freely open, and light, nourishing diet allowed.

CHAPTER IV.

RUPTURE OF THE UTERUS.

RUPTURE of the uterus is one of the most terribly fatal accidents which can befall a parturient woman. Its frequency has been estimated by Dr. Churchill at about 1 in 1318 cases, on an average of 154,303 cases of labor. But it seems to have been much more frequent with some practitioners than others, and there is some doubt as to the value of these figures from the suspicion that ruptures of the vagina may have been included in them. Dr. Ramsbotham, in upwards of 55,000 cases, had an average of about 1 in 4000 labors; while Dr. McKeever, in 8600 cases, met with this accident 20 times, or about 1 in 400.

The rupture may occur at any part of the uterus—fundus, body, or neck. It may involve the entire thickness of the uterine wall, thus laying open the abdominal and the uterine cavity, and this is the most common form; or the rent may extend only through the mucous coat and the proper tissue of the uterus, leaving the peritoneum entire; or lastly, the peritoneum may be ruptured alone or with slight injury to the muscular tissue.

When the latter is the case, a number of small cracks or fissures will be observed in the serous coat, varying in length from a quarter to half an inch. "They are almost always curved, with the convex part towards the fundus, and may be situated on the anterior or posterior wall of the organ" (*Churchill*). The most common situation, however, is about the junction of the uterus with the vagina, and somewhat more frequently behind than before.

Rupture of the uterus is an accident more common with multiparæ than primiparæ; thus according to Churchill, of 75 cases 9 only were primiparæ, 14 occurred in the second, 13 in the third, and 37 in the fourth or subsequent pregnancies. It is observable, also, that in the majority of cases the laceration took place at rather an early period of labor; thus in 20 out of 36 of Mr. Robertson's cases, it happened in 9 hours after the commencement of labor, and in 15 out of 24 of Dr. Collins's cases it occurred in 6 hours.

The direction of the laceration varies: sometimes it is parallel with the long axis of the organ; at others transverse, and it may be so extensive as completely to separate the body from the neck of the uterus; or it may take an oblique direction. Generally the rupture takes place suddenly, and when it is complete the child escapes at once into the peritoneal cavity; but in a few rare cases the rent takes place more slowly, and extends further with each pain. The accident may involve the vagina together with the uterus; and may even extend to the bladder, though this is very rare.

Sometimes the uterus is found to be the seat of disease prior to the laceration. There is always a good deal of blood effused either into the uterine or abdominal cavity; and should the patient survive the shock, peritonitis is sure to follow.

The *Causes* of rupture of the uterus are numerous; and they may be thus classified in the order of frequency of occurrence. 1. *Deformity of the pelvis*, especially where the uterus has been previously injured by disease or has been weakened by prolonged and exhaustive action, the uterine fibres being rendered thereby incapable of bearing the strain put upon them. Generally, however, the rupture takes place in these cases in consequence of the uterus being thrown into too violent action. 2. *Previous organic disease of the uterus* predisposes to this accident. Dr. Murphy has shown that inflammation of the uterine tissue occurring either before or during pregnancy, may occasion a thinning and softening of the wall of the uterus, and thus favor laceration. Cancer of the uterus acts in a similar manner. 3. *Cicatrization and occlusion or contraction of the soft passages*, by opposing the progress of labor and so exciting violent and excessive uterine action, may induce inflammation and gangrene, and thus lead to laceration. 4. *Rigid or imperforate os* may give rise to the same. Dr. Tyler Smith considered that this accident may happen simply from excessive uterine action without any abnormal obstruction. 5. *Turning and other obstetric operations* have sometimes occasioned rupture, and this without any carelessness or violence in the operation, but simply from some peculiar and unforeseen condition of the uterine wall; but the accident is more likely to happen when turning is attempted before the soft parts are sufficiently dilated, and especially where the liquor amnii has escaped for some time, and the uterus has become firmly contracted on the child. The careless or improper employment of the forceps, and violence in removing the placenta, have also occasioned laceration. 6. *Sex of the child*, though not *per se*, but owing to male being generally larger than female children, has an influence on this accident; thus of Dr. Collins's 34 cases, 23 were males, and of Dr. McKeever's 20 cases, 15 were males. 7. *Obliquity of the uterus*, by driving the child's head against the side of the cervix uteri, has been stated as a cause of rupture. 8. *Malpresentations*, as of the arm, shoulder, side, or breech. 9. The *administration of ergot* in unsuitable cases. 10, and lastily, *Mechanical injuries*, such as blows, falls, bruises, and such like, may occasion immediate laceration, or the uterus " may be so weakened in structure at some particular point as readily to give way during its efforts to accomplish delivery " (*McKeever*). Not infrequently, especially in Paris, where so many cases of labor are attended by midwives, who from ignorance or impatience of delay rupture the membranes before the parts are well dilated, the head presses on the os and irritates it, and the whole uterus is thrown into violent action, while the os being undilated rupture takes place.

The *Symptoms* of rupture of the uterus, when complete, are generally so plainly marked as to leave little doubt as to the true nature of the case. In a few rare cases there are certain *Premonitory Symptoms*, but they are not such as can be depended upon. Probably nothing particular will be observed in the case, except, it may be, violent and continued uterine action, without any corresponding progress in the labor, when all of a sudden a peculiar and most agonizing pain will be felt, following, perhaps, quickly on an ordinary labor pain, and causing the patient to shriek out most wildly. The pain is of a violent crampy character; sometimes the patient will complain of something having given way, and immediately after this all uterine action ceases; then a deadly sickness and oppression comes on; cold clammy sweats burst over the patient; the pulse becomes very small and quick; her countenance assumes a hollow, anxious expression; the presenting part of the child recedes beyond the reach of the hand; and its limbs can now easily be felt through the abdominal parietes; collapse supervenes, with perhaps convulsions; and hæmorrhage takes place from the vagina to a variable extent; vomiting also succeeds; the matters ejected having at first nothing remarkable, they soon assume the well-known coffee-grounds appearance so strongly indicative of collapse and exhaustion. The respiration becomes labored and quick, the pulse more and more feeble, the countenance extremely anxious and haggard; and either immediately or in a few hours death from collapse, preceded sometimes by intolerable suffering, takes place.

Of all these symptoms, the peculiar sharp, sudden, and severe pain, the cessation of all uterine action, the recession of the child, and the being able to feel it easily by the abdominal wall, the hæmorrhage, and the collapse, these together make up a total which are almost certainly indicative of ruptured uterus. Of course there is not only hæmorrhage per vaginam, but a good deal of blood may also escape into the peritoneal cavity—so much, indeed, that this alone is sufficient to cause death in some cases.

It occasionally happens, as I have said, that only a small rent is made in the uterus, and that no part or but very little of the child escapes into the abdominal cavity; in such a case, therefore, this symptom would be wanting, while the others remain. But even in cases where only a rupture of the peritoneal coat takes place, the same general symptoms occur.

On the other hand, when only the vagina is ruptured the pain is not nearly so great nor so sudden, but the collapse is equally great, and the result little if at all different. The presenting part of the child will still be felt, but there will probably be rather more external hæmorrhage.

Should the patient recover from the immediate collapse, a reaction occurs after perhaps twelve or eighteen hours, and then symptoms of acute and violent inflammation of the peritoneum or uterus, or both, set in; the pulse is quick, small, and wiry, the breathing hurried, and there is acute lancinating pain in the body, with great tenderness on pressure. The legs are drawn up and unable to be straightened from the extreme pain caused by stretching the abdominal muscles. This reaction and inflammation will probably follow the usual course, except that it is quicker and more severe, resembling that of punctured abdominal wounds, and almost certainly terminates in death, though it may be that this result does not take place for many days.

If the patient recovers from the inflammatory attack, the secondary evils of pelvic cellulitis, abscess, etc., are pretty sure to destroy life. There are, however, a few cases on record where recovery has taken place, even when the patient has retained the fœtus encysted in her abdominal cavity, in cases where it was completely driven into that situation.

Treatment.—Immediate delivery of the child, if that be practicable, is the first thing to claim attention: where the os is fully dilated, or soft and dilatable, the forceps should be at once applied; but supposing that there is not sufficient dilatation for this, or that the child has changed its position so as to be out of reach of the forceps, then turning may be attempted. It is evident from statistics that the sooner the child is born the greater is the mother's chance of recovery. One caution is here necessary. In extracting a child from the abdominal cavity back again through the ruptured uterus, great care must be taken lest at the same time we draw, or there is forced into the uterus, through the rupture, any portion of the abdominal viscera, for it need hardly be said that to fix a portion of the intestine in the uterine laceration would pretty certainly lead to fatal strangulation. I should have said, indeed, that such an accident was necessarily fatal, did I not know of a case in which this had occurred, the intestine subsequently sloughing and coming away, and the patient recovering with a fecal fistula from the bowel at the point where the rupture of the uterus had occurred. I have already considered, in the chapter on funis presentation, the treatment that should be adopted in cases where rupture of the uterus occurs with escape of the intestine through it. If the forceps cannot be applied, nor turning accomplished, then the perforator may be resorted to, if that offers the hope of speedy delivery; at the same time it must be borne in mind that rupture of the uterus, if completely through the wall, is so fatal an accident to the mother that we are bound to give full consideration to the child's life, and not to sacrifice it heedlessly as if it were of no value.

In cases where the child has receded in great part, but not entirely, into the abdominal cavity, the hand and arm must be introduced as far as need be, and the child be extracted, if possible, by turning. There is no chance for the mother with the child half in the abdominal cavity and half out, and the sooner it is extracted from this situation the better.

If all these means fail, or are inapplicable, the child being in great part in the peritoneal cavity, then the operation of gastrotomy should be resorted to; there are several cases on record where this has been successfully performed, and there can be no doubt that formidable as it is at all times, and perhaps doubly so under these circumstances, yet it is a proceeding which offers at least a better chance of success than leaving the patient to nature with a fœtus at large in her abdominal cavity.

It need hardly be said that for the state of collapse, stimulants and restoratives should be freely administered; there need not be the slightest fear, which some entertain, of "aggravating the reaction;" indeed, unless stimulants are given in some considerable quantities, the reaction will only be a reaction ending in death. It is in these cases, when the nervous system has sustained a severe shock, and is, as it were, prostrated by it, that the stimulant method of treatment finds its fitting exercise. I have no hesitation in expressing my belief that there is no remedy, if such it can be called, which will be of any avail except alcohol. At the same time no doubt we should not trust merely to alcohol as a restorative; food, and especially strong beef tea and milk, must be given freely. Opium must also be given to calm nervous excitement; but it should be given with extreme caution, and never until all symptoms of collapse have passed off. The rest of the treatment during the inflammatory stage will consist in great part of the administration of these two agents proportioned to the exigencies of the case. The so-called antiphlogistic treatment will be quite out of place here; the inflammatory reaction should be regarded as the necessary process of cure, and the duty of the physician will be to watch calmly the operations of nature, without interfering with the process, while at the same time he endeavors to strengthen and support the system in its struggle against morbid action: in a word, as Sir Thomas Watson has expressed it, he has, to the utmost of his power, to resist the tendency to death.

RUPTURE OF THE BLADDER.

This accident is happily not a common one; for it is certainly one of the most calamitous accidents which can happen to a lying-in woman; fortunately, however, it is one which will seldom or never occur under judicious management, most of the cases where this accident has happened being traceable either to culpable neglect or to ignorant delay of proper interference.

The rupture may take place either into the peritoneal cavity or into the vagina—though, as a rupture, the accident is usually confined to the former; and in that case, the urine coming into contact with the peritoneum, sets up such a severe form of inflammation as almost invariably destroys the patient. When the rupture occurs into the vagina, a fistulous opening remains after labor, through which the urine flows; and the patient having no control over it, is in consequence reduced to a most deplorable condition.

Sometimes, simultaneously with the production of the vesical fistula, a similar laceration occurs into the rectum, giving rise to what is called a "recto-vaginal fistula:" in these cases nothing can possibly exceed the misery and distress of the patient, who is thus reduced to a state of wretchedness which is almost unbearable. Recto-vaginal fistulæ are, however, much less frequent than vesico-vaginal.

Rupture of the bladder into the peritoneal cavity is always the result of overdistension of that organ by the accumulation of urine from inability to empty it, in consequence of the pressure exerted upon the neck of the bladder. Hence the rule in all cases of tedious labor where the patient is unable to void urine, to pass a catheter occasionally, and thus secure the bladder against overdistension; neglect of this practice is the invariable cause of rupture.

The *Symptoms,* though somewhat less in severity, resemble very much those of ruptured uterus; there is a sudden and violent pain in the lower part of the abdomen, and the patient is often conscious of something having given way; the pulse becomes small and rapid, there is an anxious expression, rigors, cold clammy perspiration, and the general indications of collapse; but in contradistinction to rupture of the uterus, there is no hæmorrhage externally; no recession of the presenting part of the child, and no indication of its presence in the abdominal cavity; uterine action, at least for a time, goes on as before; but the abdomen becomes rapidly distended and excessively tender and painful.

The *Treatment* to be adopted has reference at first to the child, for little can be done by way of treatment so long as the patient remains undelivered. If the head can be reached, and the parts are dilatable, the forceps should be applied; if they are inapplicable, turning should be attempted. Some have suggested the performance of the Cæsarean section when it is evident that the mother is sinking, and that the only chance of saving life is to attempt to rescue that of the child, but the cases must be very exceptional in which any such interference is necessary or right; it is, however, very probable that fatal collapse will result from peritoneal rupture of the bladder, and in that case, of course, the life of the child would be of paramount importance.

The subsequent management of these cases, supposing the mother delivered, and to have recovered from the first shock of the accident, will be the same as for peritonitis—opium in moderately large doses, counter-irritation to the abdomen, alkalies, and a generally supporting plan of treatment will be the remedies chiefly required; but when it is remembered that the opening remains in the bladder, and that consequently urine will continue to be poured into the peritoneal cavity, it will readily be seen how futile must be the attempt to check the inflammatory process. Opium is the chief, perhaps the only remedy likely to be of service, with such support as may seem needful. The operation suggested by Blundell, of opening the abdomen, washing out the cavity, and stitching up the rent in the bladder, does not appear to be a very hopeful proceeding, and I do not know of any case in which it has been performed.

FISTULÆ.

Vesico-vaginal fistulæ, unlike ordinary rupture of the bladder, are seldom due, directly at least, to overdistension of that viscus and consequent rupture, but are usually caused by long-continued pressure upon the bladder, either by the forceps or by the fœtal head. Such pressure destroys the vitality of the bladder structures, and either at once produces a slough, or sets up inflammation and subsequent ulceration, by which an opening is made. The bladder may be opened by ulceration extending from the uterus, as in cancer or corroding ulcer. When it results from pressure during labor, it is found that a long-sustained pressure is more certainly mischievous than one shorter but more severe. Statistics abundantly prove this statement, and point very forcibly to the conclusion that patients ought not to be allowed to remain undelivered for many hours with the child's head immovably fixed in the cavity of the pelvis, pressing upon the bladder and leading to its subsequent sloughing.

The opening may be situate either at the neck or back part of the bladder, and will of course, vary in size according to circumstances.

The *Symptoms* are incontinence of urine, with a constant dribbling of water from the vagina. Considerable irritation is caused by this: the parts become very sore, inflamed, and possibly excoriated. And upon examination the existence of an opening will be easily demonstrated by passing a sound or catheter into the bladder, when with one finger in the vagina and a little manipulation the former can be felt by the latter, and possibly the catheter may pass through the opening from the bladder into the vagina, when the size and position of the opening can be made out. The introduction of a speculum into the vagina will also at once reveal the nature and extent of the mischief.

When the fistula is the result of sloughing, caused by long-continued pressure during labor, the symptoms begin within two or three days after delivery, first by difficult micturition—hence the need for inquiry into this symptom after labor, especially when the labor has been rather tedious—then comes inability to retain the water, which is soon noticed to be always dribbling away.

The *Treatment* is necessarily surgical. We cannot expect nature to effect a cure, and medicines are of no avail. Various means have been proposed and adopted. Some have recommended the local application of caustics to the edges of the opening for the purpose of securing contraction and subsequent closure of the opening, and in a few cases, where the orifice is very small, this proceeding may at least be attempted; but in my experience it has never been successful, even when the opening was exceedingly small. Others have employed the actual cautery, and apparently with a somewhat larger success. It has, I believe, occasionally succeeded in cases where the opening was too big to apply the other caustics, but though I have tried it in two or three cases, I have never yet found it answer. The iron should be applied at a *white* heat, and only around the edges of the opening.

The other operations which are now usually resorted to have, by reason of the many improvements effected in the details of the proceedings, met with an amount of success formerly quite unknown. These all aim at bringing the previously pared edges together, and keeping them *in situ* by means of sutures. The operation is admirably described and illustrated in Mr. I. B. Brown's *Treatise on the Surgical Diseases of Women*, to which I would refer the reader as being by far the best account we have of the various details of the operation. It is also well described and beautifully illustrated in Dr. Savage's *Atlas of Anatomy of the Pelvic Viscera.*

Other forms of urinary fistulæ exist, such as the *Vesico-Uterine*, where an opening exists between the uterus and bladder; and *Vesico-Utero-Vaginal*, the opening communicating both with the uterus and vagina. These may all be produced in the same way as the ordinary vesico-vaginal fistula, and they give rise to pretty much the same general symptoms. The diagnosis is easily made by examination with the speculum, when the urine will be seen flowing from the os uteri. In the one case no opening into the bladder can be seen, in the other the opening into the bladder will be seen to involve the anterior lip of the uterus and to extend into the cervix, or possibly into the body of the uterus.

For a description of the operation required in these cases I would also refer the reader to the work of Mr. Brown, mentioned above, in which several such cases are described as having been treated by the author.

Lastly, *Recto-Vaginal Fistulæ* occasionally result from the long-continued pressure of the child's head, producing inflammation and sloughing. The opening varies both in extent and direction; but the sphincter ani is seldom or never involved except in cases where laceration of that part has occurred in connection with laceration of the perineum.

The *Symptoms* are a constant involuntary discharge of fæces and fecal gas per vaginam; when these exist there can be no doubt whatever as to the nature of the case.

Treatment aims at a union of the edges of the opening, and this has been effected in a few cases by the application of caustics, especially the actual cautery; but it is very little more trouble, and is certainly more successful, to pare the edges and bring them together by some such means as is adopted in the case of urinary fistulæ. This operation is easier of performance, and generally attended with better results than that for vesico-vaginal fistula, doubtless from the fact that in the latter case the secretion is constantly coming in contact with the surfaces, and so endangering the healing process; while in the former the admistration of opium will prevent the fæces from reaching the rectum until sufficient time has been allowed for union to take place.

RUPTURE OF THE VAGINA.

Rupture or laceration of the vagina, independently of any injury either to the bladder or rectum, is an accident which, so far as I know, had not been noticed by any writer until Dr. McClintock described it in a paper before the Dublin Obstetrical Society; it cannot, therefore, I think, be of very frequent occurrence, even among the lacerations we are considering, and certainly it has not been so in my experience. Yet Dr. McClintock states that of 108 ruptures of all kinds which occurred during a series of years in the Dublin Lying-in Hospital, in no less than 35 cases was the mischief limited either to the vagina alone, or to the vagina and cervix. The laceration appears usually to take a circular direction, and, owing to the arrangement of the muscular fibres of the part, it always remains patulous. Hence, according to Dr. McClintock, the escape of the child into the peritoneal cavity is more common in this accident than in rupture of the uterus. In like manner and for the same reason prolapse of the intestine through the laceration is not uncommon.

The *Causes* of the accident are not very obvious: it does not seem to be due to any contraction of the pelvis, for in most cases the child's head has engaged the cavity when the rupture occurs, nor does it seem likely to be caused by any contraction of the vagina itself; but it may perhaps originate in some way by violent uterine contraction drawing upon the upper part of the vagina while its lower part is fixed by the head of the child which is being driven to the pelvic outlet.

Dr. McClintock states that there are *no premonitory symptoms*, and that the *ordinary symptoms* which result from the laceration are less severe than those which occur in cases of rupture of the uterus. It appears further that the mortality is less in the former than in the latter case, for of 35 cases of rupture of the vagina alone 4 recovered, or 1 in 8; while of 73 other cases 4 recovered, or 1 in 18; in 2 of which the seat of rupture was unknown.

As regards *Treatment* the indications are the same in this as in the other varieties of rupture of the uterus. If possible the labor should be terminated quickly, and we should be especially on our guard against the probability of a portion of intestine becoming prolapsed through the opening; should it do so we must on no account adopt the practice of cutting it off, but rather try to return it, and if that fails then wait upon nature and watch the result, giving opium and keeping up the strength.

RUPTURE OF THE PERINEUM.

To a limited extent this accident occurs in a large proportion of primiparous labors, but in these it is of trifling importance, for the true perineum, the cutaneous portion, is scarcely if at all injured, the laceration being almost entirely limited to the mucous surface, which is protruded during the passage of the child's head through the external parts.

Where the true perineum is really torn, the extent of injury varies a good deal. It may not reach further than the anterior border of the sphincter ani; or it may extend through the sphincter, thus opening the vaginal and rectal cavities; or the laceration may take place through the recto-vaginal septum itself, the child as it were coming through the anus and lacerating a part of the sphincter ani and perineum, but leaving its anterior portion intact; or lastly, the fourchette may remain uninjured while an opening is made *in* the perineum behind the fourchette, and through the opening thus made the child has been known to pass, dividing in its passage the sphincter and part of the septum between the rectum and vagina. These two last are described as separate and distinct accidents, but it seems likely that they are indeed one and the same.

"This accident (perforation of the perineum) may arise from a variety of circumstances; the direction of the pelvic outlet may be faulty, or the inclined plane formed by the lower part of the sacrum, by the sacro-sciatic ligaments, etc., may be insufficient to guide the head forwards under the pubic arch; or the perineum may be unusually broad, in which case the power of the uterus being directed against the centre of it, the head becomes enveloped in a bag of protruded perineum; and if the pains are violent, and the head not properly supported, it at length bursts its way through the centre without even injuring the frænulum" (*Rigby*).

Ruptured perineum is *caused* very frequently by too speedy delivery, the perineal structures not having had time to stretch and dilate by the gradual pressure and stretching of the head. Or there may have been plenty of time and pressure, but the tissues are so rigid and unyielding, that at last they give way to the final passage of the head. This accident is likely to occur where there is narrowing of the pubic arch; where the perineum is unusually long, or the hymen nearly entire; and in certain cases of malpresentation; also where delivery requires to be terminated speedily by instrumental means.

The *Symptoms*, provided that the rent has not extended through the sphincter ani, will be of little importance; indeed, except that there is some tingling and smarting from the raw surfaces being irritated by the discharges, the patient will probably make no complaint at all; and only actual inspection will reveal the true nature of the case. But it is far otherwise where the sphincter ani is divided, for not only is there a great sensation of weight and bearing down, but the patient is unable to retain the fæces or flatus, which consequently escape involuntarily, causing an amount of discomfort and annoyance which can scarcely be described.

The *Treatment* in the simpler cases, where only the mucous membrane or the perineum alone is torn, without involving the sphincter ani, is generally a very easy matter; that which during, or immediately after labor, looked rather serious and extensive, contracts so much in the course of a few days, "that what was a wide rent of an inch and a half long, in a couple of days will be scarcely more than two or three lines in length." The only thing necessary is cleanliness conjoined with perfect rest, keeping the legs in close and constant apposition, and the bowels for a day or two confined, so that nothing shall interfere with the healing process. The urine should also be drawn off with a catheter. Some advise that the bowels should be kept gently relaxed. I am sure this is a mistake, for it is next to impossible, in relieving the bowels, to prevent fecal matter from coming in contact with the raw surface, and the smallest quantity of this will effectually prevent healing taking place; besides, the movements necessary in evacuating the bowel are almost certain to destroy any healing process. In some cases, even where the sphincter is not torn, it may be desirable to endeavor to effect union of at least some part of the laceration; in that case one or more sutures should be applied immediately after the accident; this is far preferable to waiting; indeed, the delay of a few hours will probably prevent union taking place.

The treatment of cases where the sphincter ani is divided, and where, consequently, an operation will be necessary, varies not only in regard to the operation itself, many plans having been suggested and carried out, but also as to the time at which such proceedings should be attempted. Some recommend that immediately after labor, or as soon as the accident is discovered, the operation should be performed; while others advise that nothing should be done till some days after delivery. The former of these is in my judgment decidedly the better plan; the surfaces are then freshly torn, they are clean, accurately adapted to one another, and will readily unite if placed under proper conditions: the operation is thereby greatly shortened, the necessity for paring the edges being dispensed with; moreover, as the patient must keep her bed for some days, time is being economized. The differences in the operation itself relate chiefly to the kind of suture employed, of which there are three varieties—the quilled, the interrupted, and the twisted. The former of these seems generally to be preferred, as it is thought to secure a more thorough apposition of the parts, and to maintain them better in that position. I am not, however, prepared to accept this; for I have many times operated for ruptured perineum, using only the ordinary interrupted suture without any quills, and the result has been perfectly satisfactory; indeed, on the whole, more so than with the quilled suture, for I have had no troublesome sloughing with the one, while I have often seen it with the other. Of late years I have entirely given up the quilled suture, and now never use anything but the ordinary interrupted silver suture. Some have suggested the division of the sphincter ani on either side; this, no doubt, relaxes the parts, and allows greater facility for keeping the torn surfaces in contact; but I question the necessity for it, and, on the whole, prefer to omit it. Division of the sphincter is also recommended when the operation is performed at any subsequent period.

The bowels should be kept confined for two or three days after the operation; the diet must be light, but nourishing; and perfect rest should be enjoined.

It is very necessary to restore, if possible, the perineum to its original breadth and length, as otherwise prolapsus and procidentia uteri are pretty certain to follow. Should the first attempt at union be unsuccessful when made immediately after labor, it may be repeated at any subsequent period, the edges being pared and brought together as in the previous case by quilled or common interrupted suture, and the sphincter may, if thought necessary, be divided as before; or instead of dividing the sphincter, the proceeding recommended by Dieffenbach may be tried, namely, to make a small incision on either side through the integuments, parallel with and external to the laceration, the object being to relieve all tension, and so to favor apposition and union. I have never performed this operation, nor do I know any one in this country who adopts it, so that I am unable to bring any testimony either for or against it.

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CHAPTER V.

INVERSION OF THE UTERUS.

This accident is happily a very rare one, for it is often difficult, sometimes even impossible, to cure, and is always extremely dangerous. It consists of a turning inside-out of the uterus, so that in the worst cases the inverted fundus appears at the lowest part, the os is situate uppermost, and that which was the inner mucous surface of the organ has now become its outer surface, the cavity of the tumor being lined with the inverted peritoneum, and containing portions of the Fallopian tubes, with the ovaries.

The inversion may not, however, be quite so complete as this; the fundus may only be *depressed* a little way, forming a convex roof to the uterine cavity, and being cup-shaped on its peritoneal aspect; or the inversion may have proceeded to a yet greater extent, the fundus appearing at the os, but the latter still maintaining its normal position. Hence the division into *partial* and *complete* inversion.

Though this condition is occasionally met with in the unimpregnated state, and is then sometimes difficult of diagnosis, yet, as a rule, it may be said that it is seldom produced except immediately after labor, or very rarely, in certain cases of polypus, situated at the fundus uteri. It can only take place in these latter cases when the os is dilated and the uterus itself large and flabby. When it occurs after labor, it is generally produced suddenly, as the result of some violence; but in the case of a polypus of the uterus the displacement is brought about gradually by the long-continued dragging of the fundus by the tumor. The one is sometimes called *acute*, the other *chronic*, though the former may, if neglected, or if incapable of reduction, result in the latter—perhaps the terms used by Dr. Radford are preferable, namely, *reducible* and *irreducible*.

The *Causes* of this displacement are various. It has been produced in cases of precipitate labor, where the child has been thrown suddenly upon the floor, the patient being in an upright position; here probably the fundus was drawn downwards by the forcible dragging of the placenta. In the same way it is said to be produced by too great haste in extracting the placenta, by pulling upon the cord, the uterus at the same time being in an atonic condition, large and flabby; in cases also where the cord is unusually short, or has been twisted round some part of the child. It has sometimes occurred spontaneously after labor, apparently as the result of some irregular and violent action in one part, the other portions remaining in a state of inertia. Violent expulsive efforts shortly after delivery, such as straining, coughing, sneezing, and vomiting, are also cited as causes of inversion; and lastly, it may be produced by the continuous dragging on the fundus of a polypoid growth. Many authorities have thought it extremely doubtful whether dragging upon the cord after labor does produce this state, and it is certain that in many of the cases which have occurred no such cause was exerted; still, it is not at all unreasonable that in certain cases such might be the result of traction for the removal of the placenta, and it is well, therefore, always to be careful in this matter.

In my own experience I have only met with two cases of inversion of the uterus, both of which were most alarming. In one the patient had had a very tedious labor, and I was obliged ultimately to deliver with the forceps; the placenta not coming away after three-quarters of an hour, I removed it. There was no hæmorrhage, and all seemed well, but in about a quarter of an hour the patient complained of feeling very faint, and I found that a gush of blood had taken place. On attempting to grasp the uterus externally, to my horror no uterus could be felt there, though the patient was very thin and small. On examining per vaginam I found that a mass the size almost of a fœtal head occupied the vagina down to the vulva, and could easily be seen on separating the labia; it was a brilliant red mass, and was bleeding profusely at all points. The patient meanwhile seemed in a state of collapse. I at once administered brandy freely, grasped the mass in the vagina and succeeded in reducing it, at the same time giving a dose of ergot. To my surprise, I had scarcely taken my hand from the vagina when another gush of blood occurred, and on examination I found that the uterus had again inverted as before. The patient now seemed *in extremis;* I, however, persevered, and reduced the uterus once more; but again it came down, and again I returned it, and in doing so the third time it appeared so utterly without any contractile power that I had literally to hold up the fundus with the hand externally, to prevent its again dropping as it were inside out. Ultimately by filling the uterus with lumps of ice, giving more ergot, and grasping the fundus firmly outside, I succeeded in securing contraction; this patient ultimately made a good recovery; it was her first child, and her last.

The only other case of the kind I have seen was one to which I was called in consultation; the labor had been natural but tedious, and after the birth of the child the uterus was rapidly inverted with the placenta attached. At first it was thought to be a polypus, and no attempt was therefore made to reduce it; this diagnosis was, however, corrected a few days afterwards, and reduction was accordingly effected.

The *Symptoms* of inversio uteri are generally pretty well marked, and are always of a serious and alarming character in proportion to the amount or degree of inversion; they have reference chiefly to the nervous system, which gives evidence of very severe shock. In the slighter cases there is great pain, of a dragging or bearing-down character, situate chiefly in the back and groins, with more or less hæmorrhage—"the patient suffers under an oppressive sense of sinking, with nausea or vomiting, cold clammy sweats, feeble, fluttering, or nearly extinct pulse, faintings, or even convulsions:" these are the kind of symptoms which always occur to a greater or less extent; but "the most universal symptom is a sudden exhaustion or sinking, which comes on immediately after the inversion." The amount both of the hæmorrhage and of the pain varies; they are greater in the incomplete than in the complete inversion, and, as a general rule, though the symptoms are less severe in appearance in the latter than in the former, they are not so in reality, for the shock to the nervous system may be so severe that, in some instances, the patient has died almost immediately.

On examining the abdomen, we shall probably not be able to feel the uterus at all, while, per vaginam, a round hard tumor will be felt, which may be visible even beyond the external parts. It is of a bright-red color, its surface being smooth and bleeding: the size of the tumor will, of course, vary with the amount of inversion, and partly also with the time which has elapsed since it took place. In recent cases there is generally a good deal of swelling, possibly from the return of blood being prevented by the narrow constriction of the now inverted os.

From the above symptoms there will not often be much difficulty in recognizing this condition in acute cases connected with labor; but in the more chronic cases the condition may possibly be confounded, especially if the displacement is complete and the more aggravated symptoms have passed off, with polypus of the uterus: however, the previous history and symptoms of the case, and the inability to discover anything like the os uteri, together with the peculiar appearance of the tumor, will generally suffice to point out the exact nature of the case. Moreover, by means of the uterine sound all doubt as to the nature of the case can readily be solved, for in cases of polypus uteri we should be able to pass the sound into the uterine cavity, at least as far as in the normal uterus, and probably much further, while at the same time the fundus would be felt by external palpation, but in the case of inversion no fundus can be felt externally, nor can the sound be passed into the uterine cavity.

Treatment.—There is but one object to be aimed at in the treatment of inversion after delivery, namely, to restore the displaced organ; and there is one rule which is always applicable—the sooner this is done the better. There is no time when reduction is so easy, although it is always more or less difficult, as immediately after the accident. "The impossibility of replacing it if not done soon after the accident, has been proved in several instances to which I have been called so early as within four hours, and the difficulty will be increased at the expiration of a longer time." (*Denman.*) The proceeding should be conducted somewhat as follows: The uterus is to be firmly grasped, so that the vessels of the organ may be emptied by compression: pressure should then be exerted gradually but firmly upon the fundus by the palm of the hand. In this way the organ will generally return, but the hand should still follow it, and the pressure must be maintained for some time between the fundus externally and the hand internally. Sometimes the uterus will all of a sudden return into its proper position, "like a bottle of india-rubber when turned inside out." The hand should, however, still follow it into the cavity till it is grasped by the uterus, and should only be withdrawn by the gradual contraction of the uterus upon it. As far as possible we should endeavor to "return first that portion of the uterus which was expelled last from the os uteri."

Much difference of opinion has existed as to what is best to do in cases where the placenta remains attached. Some recommend that before reduction is attempted it should be removed; while others advise that it should be returned with the placenta still attached. Against the latter it is contended that the operation is made more difficult by reason of the bulk to be replaced, while against the former it is urged that the risk from hæmorrhage is certainly augmented. In my opinion, it is advisable in all cases to remove the placenta before replacing the organ: indeed, in many cases, reduction is impossible except in this way. Moreover, some authorities who formerly advised the retention of the placenta, which was the practice first adopted, now recommend that it should be removed.

In cases where the uterus has been some time displaced, and has become swollen, the parts also being hot and dry, if there be much difficulty in effecting replacement, it is better, rather than run any risk of injury, or increase still further the inflammatory state, to wait until, by proper treatment, such as local depletion, warm astringent fomentations, and saline laxatives, the swelling and inflammation are subdued; reduction may then be attempted, and it will generally be found to be greatly favored by exerting firm pressure by the hands equably on all parts of the uterus, so as to empty by compression the distended vessels. Dr. Tyler Smith recommended the use of continuous pressure by means of elastic bags filled with water, introduced into the vagina, the pressure being exerted against the inverted fundus. Several cases are recorded in which this operation has been successfully carried out—one such is related by Mr. Lawson Tait in the eleventh volume of the *Obstetrical Transactions*—and as the proceeding involves no danger it is a practice which ought certainly to be adopted. The principle is that of tiring out the uterus, as it were, and so getting it at last to relax against the pressure brought to bear upon it.

Where the case has gone on unrelieved for many weeks, months, or even years, though attempts should always be made to secure reduction, especially after the successful cases of M. Barrier, where fifteen months had elapsed, yet the chances are very greatly against success; and if all attempts are fruitless, the question of resorting to extirpation of the organ will have to be considered, for the effect of this displacement is to seriously undermine the patient's health by keeping up profuse discharges both at the menstrual period and during the interval. The case now resembles very much, in some of its features, a case of uterine polypus; I do not mean as regards the physical signs, for the diagnosis is generally pretty clear if care be taken, but as regards many of the symptoms: there are the same constant dragging pains, and the same kind of discharge, though the hæmorrhagic attacks are worse in the case of polypus than in that of inversion. The resemblance also extends to the question of treatment, for if reduction be impossible extirpation is the only course open to us. The best mode of removing the organ, according to some authorities, is to place round its base a ligature, which is to be drawn as tightly as possible, so as to allow the mass to slough off. Others, however, think that it may be removed more expeditiously and better by means of the écraseur. The danger in the latter case is the liability to hæmorrhage. But for fuller details of this operation the reader is referred to our text-books on the surgical diseases of women.

PART VII.

PUERPERAL DISEASES.

CHAPTER I.

PHLEGMASIA DOLENS.

Few diseases connected with the puerperal state have attracted a larger share of attention than that we have now to consider, and there is none about which more diverse opinions have been entertained respecting its nature and origin; even now it may be said that we are in want of a more satisfactory explanation than has hitherto been given regarding some of its most prominent features.

The disease is by no means peculiar to the lying-in woman, for it is occasionally met with in the non-parturient state—sometimes, but by no means always, associated with disease of the uterus; it has also been seen in men, and it occurs in the upper as well as the lower extremity. It was at one time supposed that it never, or very rarely, occurred twice in the same person; but so far from this being the case, it has been known to recur many times in the same subject. I have myself met with it three times in one person, and it appears rather that its occurrence once engenders a liability to it in subsequent labors.

The more frequent situation is in the left leg alone, although no satisfactory reason for this preference has been given; more rarely it is seen in the right leg only, and still more rarely in both legs together.

The *Symptoms* are generally ushered in by some slight feverish phenomena (occasionally the disease occurs as a sequela to puerperal fever). There is often slight rigors, followed by headache, quick pulse, hot skin, and pain. The latter commences sometimes in the lower part of the abdomen, deep in the pelvis, and extends to the hips and loins; it then passes under Poupart's ligament down the thigh and into the calf of the leg: more often, however, it begins in the calf of the leg and proceeds upwards. Sometimes the pain in the pelvis and abdomen is very severe, and it is generally followed pretty quickly by a fixed pain, affecting some part of the leg; but "before the appearance of any swelling or sense of pain in the limb about to be affected, women become very irritable, with a sense of great weakness, and grievously oppressed in their spirits, without any apparently sufficient reason, complaining only of transient pains in the region of the uterus; and from these the approach of the disease has frequently been foretold. After a short time they are seized with an extremely acute pain in the calf of the leg, extending to the inside of the heel, and then, observing the course of the lymphatics, stretching up to the ham, along the internal part of the thigh, to the groin, occasioning a slight soreness on the lower part of the abdomen" (*Denman*).

Sometimes none of the premonitory symptoms described above occur, but the patient at once experiences severe pain in the leg, mostly in the calf, which then becomes stiff and swollen, tender to the touch, very hot, and painful, but there is no discoloration—if anything the limb is whiter even than usual. The tenderness is most marked along the course of the femoral or saphenous vein, or the lymphatics, which may be felt to be hard and cord-like, and are marked out by a faint red line. As a rule, the parts begin to swell just in the order of occurrence of pain; if the pain is felt first in the hips and back, then the swelling begins in the nates and vulva; if in the leg, then the swelling is observed there first. The skin has a tense, shining, glossy appearance; but the swelling has not the character of ordinary œdema; it does not pit on pressure, or but very slightly, except in the early and more acute stage of the disease, and again at its termination. The swelling is not increased by hanging the limb down though the pain is greatly augmented, and instead of feeling soft and boggy, it is rather hard and stiff, and if punctured little or no fluid escapes. The swelling generally forms very rapidly; a few hours will suffice, sometimes, to double the size of the leg, and careful examination will usually show that the femoral vein seems completely blocked up, and may be felt as a hard solid cord. Very commonly, too, there is a slightly reddish line along its course. The glands in the groin also become affected, they swell up and are very painful; sometimes they take on suppuration; and in very rare cases abscesses also form in different parts of the limb.

With all this there is considerable constitutional disturbance, with feverish excitement, quick pulse, hot dry skin, furred tongue, and other phenomena, resembling at first the symptoms of puerperal fever. This state of things may last for a variable period; sometimes it is only for a few days, at other times, for two, three, or more weeks; then gradually the acute symptoms pass off, the limb, however, still remaining swollen; but now it becomes more truly œdematous, and readily pits on pressure. This may generally be taken as an indication of resolution, but for long afterwards the leg is stiff and weak, or even powerless and swollen; and in some cases it does not return to its normal condition for months or even years.

It is very seldom that the disease terminates fatally, but there may be such an amount of constitutional disturbance as to destroy the patient, or she may die from exhaustion consequent on profuse suppuration; or pyæmia may occur, and death result; or lastly, as I have once seen, death may occur suddenly, with all the symptoms of clot in the heart, generated probably by some floating coagulum which has got detached from the inflamed and plugged-up vein, and so been carried to the heart, where it has lodged and rapidly increased in size. "This is not generally a fatal disease, but it is tedious, and often accompanied with hectic symptoms. Death, however, may be caused by suppuration or gangrene; or by exhaustion, proceeding from the violence of the constitutional disease; or by exertion made by the patient, which has sometimes suddenly proved fatal; or, after the leg appears to be getting better, daily shivering with vomiting, pain in other parts, and rapid pulse, with delirium, precede death" (*Burns*).

Pathology.—I have already alluded to the difference of opinion which has existed and still exists as to the pathological nature of phlegmasia dolens. There is commonly found on post-mortem examination a good deal of serous effusion into the limb; very frequently inflammation, with occasionally suppuration of the lymphatics; and sometimes they are found plugged up with plastic lymph. But the most frequent, perhaps also the most important, change observable after death is inflammation and obliteration of some of the principal veins of the affected extremity; so frequent, indeed, is this, that some have considered that phlegmasia dolens is in reality nothing more than crural phlebitis.

Dr. Robert Lee believes "that the inflammation of the iliac and femoral veins gave rise to all the phenomena of phlegmasia dolens, and that the inflammation commenced in the uterine branches of the hypogastric veins, and from thence extended to the femoral trunks of the affected side." Dr. Rigby, however, considered that this "is manifestly incorrect, and tends to confound two diseases together which are of a very different character;" and in support of this latter opinion Dr. Mackenzie made some experiments, showing—1, that inflammation of neither iliac nor femoral veins would account for, or give rise to, phlegmasia dolens; 2, that the extensive obstruction of the veins met with in this disease is not producible by merely local causes, such as injury or inflammation of these vessels; 3, that irritation of the lining membrane of veins, independently of such local injury or inflammation, will only give rise to an obstruction of these vessels to an extent commensurate with that of the irritation which may have been excited within them; 4, that extensive irritation of the lining membrane of veins, giving rise to obstruction and all the phenomena of phlebitis, may be excited by the presence of various unhealthy matters in the blood, circulating with this fluid, and determined upon particular portions of the venous system; 5, that the origin of the disease is therefore to be sought for rather in a vitiation of the circulating fluid than in any local injury, inflammation, or disease of the veins. Dr. Humphry believes it to be due to a "preternatural coagulability of the fibrin of the blood, and a loss of its natural solvent." Other authorities consider that the lymphatics are the parts primarily affected; while some think that the nerves are originally and chiefly at fault. Lastly, as if to make "confusion worse confounded," some attribute it to inflammation occurring in the veins, lymphatics, and nerves together. Looking at the matter from a clinical standpoint, I must confess I am much more inclined to regard it as of local than constitutional origin; that the blood becomes affected, poisoned if you will, I can quite allow, and that so far the disease is constitutional, but its clinical history, the distinct manifestation of local mischief, if not antecedent to, at least coincident with, the constitutional disturbance, and the relation of this to parts which may possibly have received some injury in the process of parturition, the rarity of these local phenomena in the many undoubted instances of blood poisoning that arise in connection with parturition, and their entire independence of them, all these seem to me to point to a local rather than to a general or constitutional origin. At the same time, I am bound to admit that in the non-parturient state, the same, or apparently the same, disease occurs independently of any evident local origin, and seemingly associated with distinct blood dyscrasia. I have known it occur in persons of a gouty diathesis, and in others addicted to alcoholic drinking. The question is probably after all purely speculative, and has not, I think, much practical bearing.

Diagnosis.—It will be scarcely possible to mistake this disease for any other; the peculiar appearance of the leg, and especially the remarkable state of the veins and lymphatics, which may be felt under the skin hard and cord-like, will generally suffice to mark the nature of the case; when once seen it is not likely ever to be forgotten.

The *Treatment* of phlegmasia dolens has hitherto gone the way of all acute inflammatory diseases; and been subjected to bleeding, either local or general—more frequently the former, in the shape of a dozen or more leeches applied along the course of the inflamed veins or lymphatics. This would be followed, according to some, by blisters, repeated again and again over the same situations. Mr. Sankey writes: "What I consider a specific is a blister applied to the calf of the leg, immediately on discovering the complaint. The first I apply to the calf of the leg, as the pain is generally most severe in that part, and there is less fear of its not healing than if applied lower. If required, I repeat them every two or three days, not at the same place, but higher or lower, according to the seat of the pain." Purgatives have also been freely given, with or without tartar emetic; by some, calomel is considered *the* medicine, given either by itself or in combination with opium.

I have already on more than one occasion expressed my unwillingness either to guide or be guided by this routine, and in this particular instance I have an especial objection to it, inasmuch as I have seen the practice adopted again and again, and, as it seemed to me, with positive disadvantage. The plan which I have followed on many occasions, and which I consider far better than the above, is first to envelop the whole limb in a hot turpentine stupe, to be repeated for a quarter of an hour two or three times a day, and the leg to be kept in the intervals wrapped up in a hot linseed-meal poultice. As medicines, I give the sesquicarbonate of ammonia, in combination with the ammoniated [illegible]olution of quinine, and morphia; in this way the nervous system is quieted, the pain relieved, that great emunctory, the skin, is actively exercised, and the patient meanwhile is losing as little as possible of that strength which is so essential for making a good and rapid recovery.

Dr. Tilbury Fox, in an admirable paper on the etiology of this disease, in the second volume of the *Obstetrical Transactions*, thus sums up his conclusions: 1. In phlegmasia dolens both veins and lymphatics are obstructed. 2. The obstruction may be due simply to extrinsic pressure; 3, or to inflammatory changes in the coats of the vessels leading to coagulation (this depends upon virus action). Except during epidemics of puerperal fever, this is not so common as supposed. 4. It is pretty well admitted that rapid ingress of abnormal fluid suddenly, and in large amount, will cause instantaneous coagulation of the blood; and it is also admitted that large drains from the system are followed by rapid and compensatory absorption. There is good reason for believing that these conditions are fulfilled, in a perfect and ample degree, in conjunction with the presence of wound—facilitating absorption—in a great many cases, prior to the occurrence of phlegmasia dolens, and that the latter is frequently thus evolved. 5. These different modes of evolution may be more or less conjoined.

In accordance with Dr. Tilbury Fox's views as to the pathology of the disease, he recommends a plan of treatment based upon the following premises: 1. That a poisoned blood-state exists. 2. That the local phenomena result from this. 3. That our first object ought, therefore, to be to improve the condition of the blood by means of good food and the free use of stimulants, and then "the blood-state having been improved, by all means let the exhibition of ammonia help to diminish the local condition, remembering that the action of the drug is very transient, and it must be frequently repeated." He objects to the administration of ammonia in all cases where it is given with a view to overcome the thrombus, a practice which he very properly stigmatizes as empirical. I agree with him entirely in this view, but I give ammonia nevertheless; not, however, for the object in question, because I do not believe that it is capable of attainment, but because it is a valuable diffusible stimulant.

Whatever plan of treatment we adopt, the bowels should be carefully attended to; I mostly prefer saline purgatives, if any are needed, and the diet should be light, but highly nutritious;

a little wine, or, if there be much depression, as often happens, brandy in small doses will be found of signal benefit.

As soon as there is any indication that resolution has begun—and this is thought to be the case when the limb from having been hard and brawny, not pitting on pressure, becomes soft and more supple, and pits readily—then I think we may favor this first by the administration of iodide of potassium, with or without the iodide of iron, and afterwards by the use of mineral acids and quinine with the tincture of steel. The lymphatics of the limb should also be stimulated by the inunction of the iodine liniment, or, as I mostly order it, by a liniment composed of equal parts of iodine and belladonna liniments, or by the milder application of soap and camphor liniments; or the cantharides liniment may be used if we desire a simple rubefacient.

During convalescence, change of air and warm sea-baths will be of great service, and the limb should be kept constantly wrapped up in a new flannel bandage. If abscesses form, they should be treated according to the common rules of surgery.

CHAPTER II.

PUERPERAL MANIA.

THERE are few if any diseases more painful to witness or at times more alarming in their appearance than puerperal mania. At one time it was supposed, and pretty generally maintained, that this disease never ended fatally. This, however, is quite a mistake. There is doubtless, one form, the melancholic, which is generally unattended with any feverish or inflammatory symptoms, is usually of a chronic character, and seldom terminates in death; but then it not infrequently leads to permanent fatuity; and it is clearly proved that in the case of the acute and inflammatory form the mortality is by no means inconsiderable. My own experience on this point is, I am sorry to say, very discouraging, a large proportion of those I have seen having terminated fatally, no matter what the treatment adopted, and I have seen and have myself tried various methods of treatment.

As regards the frequency of these affections, out of 1644 women in the Bethlehem Hospital, 84 were cases of puerperal origin, and of 1119 cases in La Salpêtrière 94 were cases of this kind.

There are probably two, if not three, different varieties of this affection, though obstetric writers are not agreed either as to their number or indeed as to the nature of the several varieties. Dr. Rigby described three distinct kinds; the first, characterized by cerebral congestion or inflammation occurring either as simple phrenitis, or in the course of, and associated with, puerperal fever; the second, arising from gastro-enteric irritation; and the third, resulting from general debility and anæmia, the adynamic form of puerperal mania, as described by Gooch. Montgomery gave the name of puerperal mania to that state of mental excitement which frequently attends the expulsion of the child, when the external parts are being most painfully dilated, when the uterus is acting vigorously, and when everything conspires to make the time one of intense anguish and suffering to the patient. At such a time, however, it can hardly be wondered at that patients are "not aware of what the exact nature of their observations may have been," even if they are "conscious that they have been wandering." But this scarcely justifies the title of puerperal mania. As Dr. Ramsbotham observes, "It is the delirium—the frenzy—of high excitement, produced by intense pain. It is neither inflammatory nor maniacal."

Practically the division of cases of puerperal mania into two classes is the simplest and most satisfactory. Each of these may vary as to the time and cause of its appearance. The one is characterized by violent delirium, high fever, and great constitutional disturbance, the apparent indications of acute inflammation; the other is marked rather by depression and melancholia. The former occurs either immediately after delivery or at the commencement of lactation; the latter more often after suckling has been continued some time, and when the patient is becoming debilitated by it, though it also occurs, especially where there is any hereditary bias, at the very commencement of lactation. The one is acute, both in its onset and progress, the other insidious and more protracted. Death is a not infrequent result of the one, but it seldom happens in the other.

Symptoms of Acute Mania.—Very frequently this form of mania is ushered in by certain premonitory symptoms which begin within a few days after labor. According to Dr. Haslam, "The first symptoms of the approach of this disease after delivery are, want of sleep, the countenance becomes flushed, a constrictive pain is often felt in the head, the eyes assume a morbid lustre, and wildly glance at objects in rapid succession; the milk is afterwards secreted in less quantity, and when the mind becomes more violently disordered it is totally suppressed." There is often great irritability of temper, wakefulness, pain in the head, a restless, anxious expression of countenance, and transient loss of memory and consciousness; the patient may either sink into obstinate sullenness, occasionally interrupted by violent outbursts of passion, or she may become furiously maniacal and threaten destruction to all around her. She generally takes a fatal dislike to her child; indeed, this is often one of the first things which attracts attention, following, as it often does, on the most devoted affection; not infrequently the same dislike is exhibited towards the husband or other nearest and dearest relation. With all this there is great excitement of the circulation, throbbing of the temples, a small and quick pulse; the skin is bedewed with perspiration, the tongue is coated and somewhat dry, the bowels probably confined, and the excretions very offensive.

Very often there is a total want of sleep, occasionally convulsions, and the ordinary symptoms of puerperal fever may be superadded with suppression of the lochia and milk. The character of the pulse varies a good deal; in some, it is quick, full, and hard; in others slow, small, and soft. Dr. Gooch laid great stress upon this difference in the pulse; indeed he made it the basis of his classification. But it is not the pulse alone which thus varies, for in the one case the system generally seems under the influence of violent inflammatory action; while in the other, the symptoms are those rather of a low form of fever; "there is less excitement, but there is also less strength; the powers of the system are rapidly giving way, not so much under the effects of the local disease, as under those of the general affection by which the local disease has been produced." The temperature in the acute form is always high, sometimes as much as 104° or 105°, rarely below 101°; in the chronic form it does not rise much above the normal standard.

Sometimes, and especially when the disease is accompanied by puerperal fever, there is great fulness and tenderness over the abdomen. The bowels are often very confined, the motions being knotty, dark, and offensive, the breath is also offensive, the tongue coated with a thick, dirty-white fur, and the urine turbid and passed in small quantities.

The *Course* which the acute form of the disease may take varies a good deal; those cases are most fatal which come on suddenly, are more violent, and attended with a greater amount of fever and nervous disturbance. Where the symptoms are really caused by inflammation within the cranium, a fatal result is generally to be anticipated. "Mania soon after delivery is more dangerous to life than melancholia beginning several months afterwards," says Gooch; and, he adds, "in the cases which I have seen terminate fatally, the patient has died with symptoms of exhaustion, not with those of oppressed brain, excepting only one case." In the fatal cases which I have seen, death seemed the direct result of exhaustion, consequent upon the violence of the delirium and the maniacal excitement and the utter impossibility of procuring any sleep, or if sleep was procured it seemed only to end in the sleep of death. Sometimes a patient will go into the wildest frenzy and become so violent that it is almost impossible for any one to hold her, and then she will suddenly collapse and die.

Where the symptoms are dependent, as they sometimes appear to be, upon a disordered state of the intestinal excretions, the chances of a successful issue are certainly much greater.

Of the *Causes* of acute mania very little really is known. In many cases, probably at least one-half, there seems to have been an hereditary tendency; in most there is a high degree of nervous development. The sleeplessness, which some have thought was a cause of the disorder, is more likely to be an early indication of the disease itself. Others have enumerated as causes, cold, mental emotion, deranged bowels, and certain moral conditions. The latter, Esquirol thought, was the cause of more than half the cases, and this opinion is supported by the fact that mania occurs much more often in unmarried puerperal women than in the married. Diseases of the uterus or ovaries are said sometimes to act as exciting causes, and though this may be so occasionally, it is certainly not always; though there are many cases recorded in which undoubted disease existed in those parts and no other, and it is fair, therefore, to assume that this had somewhat to do with the mental disturbance, especially when we remember the varieties of mental excitement which occur in women as the result of sexual derangement and development, "witness the hysteric affections of puberty, the nervous susceptibility which occurs during every menstrual period, the nervous affections of breeding, and the nervous susceptibility of lying-in women" (*Gooch*). Some believe that the disease is simply inflammation of the brain or its membranes. Gooch thought that the disease is not one of congestion or inflammation, but rather of excitement without power. Nevertheless there can be no doubt that, though very rare, phrenitis does sometimes occur in puerperal mania. Marshall Hall considered that it was due to "the united influences of intestinal irritation and loss of blood."

The *Diagnosis* of this affection is not usually very difficult; it is, however, likely to be confounded either with simple phrenitis, or with the low muttering delirium of typhoid or any similar fever. From the former it is distinguished by the absence of that hard, full, bounding pulse, the intolerance of light and sound, the excruciating pain in the head, the constant vomiting, and suffusion of the eyes, all which are present, generally in a very marked degree, in phrenitis, and "conspicuous by their absence" in mania. The inflammatory fever, too, if it exists in the latter, is much less in degree than in the former. From low fever mania is distinguished by the history and progress of the case, and by the greater preponderance of the nervous as compared with the general constitutional disturbance.

As regards the *Prognosis*, Dr. Burrows gives 35 recoveries out of 37, Dr. Haslam 50 out of 80, and Esquirol 55 out of 92. Thus of a total of 209, 145 recovered; but it is curious to note that the proportion of recoveries given by these three observers, varies greatly. Of the total recoveries, by far the greater number occur before six months.

The *Treatment* of puerperal mania is of the simplest kind, but requires at the same time the exercise of great judgment. There are three things requiring special attention: 1. To remove all supposed sources of irritation; 2. To quiet the nervous system; 3. To support the strength of the patient.

To fulfil the first indication it is necessary to find out whence the irritation comes. If there be a history of previously disordered bowels with constipation, nothing will do so much good as free purgation; a scruple or half a drachm of jalap powder, with from two to five grains of calomel, will be of great service, and this may with advantage be followed by saline aperients. Dr. Rigby advised the use of antimony in combination with calomel and ipecacuanha; "It is too speedy in its operation to depress the patient much by nausea, and has the additional advantage of acting as a rapid and effectual purge; when its action is over she usually falls into a sound sleep, perspires freely, and wakes greatly refreshed."

When the bowels have acted well, and the evacuations have assumed a more healthy appearance, the second indication should, if necessary, be attended to, but opiates ought as a rule to be eschewed; they rather increase the irritability, and if there be any tendency to cerebral congestion will assuredly favor it. Some authorities say that they have derived great benefit from large doses of opium, but in many cases it undoubtedly does harm. Another remedy of this kind, is the hydrate of chloral: it may be given in doses of from twenty to sixty grains, and, while very useful in inducing sleep, it does not excite, as opium often does, nor does it produce so great an amount of depression; henbane is also a useful remedy, and chloroform is of great service; these may be repeated as often as seems desirable. Several cases have lately been published in which chloroform acted most admirably: it should be given so as to produce its full effects. White hellebore has also been strongly recommended in America, and Indian hemp has occasionally been tried with benefit. Hydrocyanic acid is another sedative remedy which has been tried and found to possess great value; it requires to be given in fair doses of 5 minims of the dilute acid every four hours. Camphor has also been highly extolled; Gooch and Campbell observed much benefit from its employment.

The third indication requires great vigilance, for the patient's strength very soon becomes exhausted under this disease, and requires to be carefully supported. With this object in view, strong beef tea, jellies, a little wine, and a generally tonic plan of treatment will be necessary.

In all cases of puerperal mania the condition of the uterine functions should be carefully inquired into, and any deviation from health corrected.

The second form of mania, that characterized by debility and anæmia, differs very much from the preceding. It may come on a few days after delivery, where there has been considerable flooding, and where the strength of the patient has been sorely tried by the labor; or it may come on some months later from debility consequent on long-continued nursing. There is generally a total absence of anything like excitement, the patient being rather in a state of melancholic depression. "There was a peculiarity," Dr. Gooch says, "about the commencement of the disease which I have seldom or never noticed at the commencement of acute mania; there was an incipient stage, in which the mind was wrong, yet right enough to recognize that it was wrong." Patients subject to this disease are generally thin, weakly, and delicate, and depressed in spirits.

This form of mania or melancholia is much more tedious than the other, and there is some danger of its becoming chronic and ending in complete fatuity; this, however, is happily a very rare result when once the patient has recovered her lost health and strength: it seldom or never ends fatally. The disease is apt to occur in those who have a strong hereditary tendency to insanity, and also in those cases "where hysteria has existed in an unusual degree during the latter part of pregnancy."

The *Treatment* is just that which common sense would suggest; the patient is suffering entirely from debility, therefore her physical condition is to be improved by a good, nourishing, and slightly stimulating diet—beef tea, eggs, or even meat—anything, in fact, which will improve the condition of the blood. As medicines, tonics, the mineral acids, quinine, and steel, will be of great service. Gentle aperients will also be needed, and they should, if possible, be combined with some vegetable bitter. The Mist. Gent. Co. of the old London Pharmacopœia is a very good form.

Another indication to be fulfilled is the calming of the nervous system, and for this purpose no drug is likely to be so useful as opium; the Liq. Opii Sedat. is the most suitable form; but if opiates disagree then the hydrate of chloral, or henbane, camphor, or Indian hemp will be of service, and in any case a caution is necessary against giving a large dose of any narcotic, especially where the delirium is at all violent, for it has often been observed that though sleep has sometimes resulted death has speedily ensued.

CHAPTER III.

PUERPERAL FEVER.

FROM a very early period in the history of medicine it was recognized that lying-in women were subject to a peculiar form of fever, characterized by great severity of symptoms and a high rate of mortality. How high this mortality is may be seen in the fact that, according to a report of the Registrar-General, there were in England no less than 1196 deaths from *metria* in the year 1868, out of a total of 2307 deaths from all causes in childbirth; and according to the same authority, in the year 1866 the deaths from *metria* were 1197 against a total of 2485 deaths in childbirth.

At first, and for long, it was supposed that there was one varying and specific poison which originated the disease, so that, however much the latter might vary in some of its more obvious features, yet that in all cases it was one and the same in its essential nature. It is now, however, thought that this is not the case, and that probably there is no specific poison as the alone cause of puerperal fever: on the contrary, it is believed by some of the highest authorities, that wherever the puerperal woman is exposed to the influence of epidemic or zymotic disease, be it typhoid fever, erysipelas, or any similar poison, there puerperal fever, as it is called, may develop itself, and that, too, in its most fatally malignant form, death occurring often in a few hours, with perhaps little or nothing discoverable after death. Further, it has been established that there are forms of puerperal fever, if that term is applicable to these cases, in which no epidemic influence is at work, no particular poison absorbed, but in which inflammation in some one or more of the pelvic or abdominal viscera, is the active agent in producing the fever.

Hence has arisen a division into at least two distinct varieties of puerperal fever. With some authorities the results of post-mortem examination have served as the basis of their classification: and thus we have puerperal peritonitis, metritis, uterine phlebitis, and the like—all being regarded as varieties of puerperal fever. Others, again, have regarded the phenomena of puerperal fever as dependent upon and originating in a vitiation of the fluids; this vitiation they have thought was brought about either by the absorption of morbific matter from the interior of the uterus, or by the more ordinary mode of blood-poisoning through atmospheric contamination and its pulmonary inhalation. Hence the analogy has been drawn between this form, or these forms, of fever, and the so-called surgical fever, which occurs after operations—the inner surface of the uterus being likened to an amputation. In this opinion I am myself disposed to agree, though I cannot at present accept the view, held by many of great repute, that zymotic diseases of all kinds become puerperal fever and nothing more when brought into contact with the parturient woman. I am inclined to think that the term "puerperal fever" is a very unfortunate one, especially since our knowledge of fevers has become so much more precise and accurate than formerly. I believe that we should have clearer and truer views of the pathology of the puerperal state if we could discard altogether a specific title which has long since ceased to have any sound scientific meaning; it is in fact a term which is used to cover a variety of meanings, and is unfortunately not only powerless for good, but all-powerful for evil, inasmuch as it is apt to divert men's minds from truth, and to retard rather than advance our knowledge of this department of practice.

It is certainly not a little strange, that even at the present time authorities are not yet agreed as to the true meaning of the term puerperal fever. Dr. Arthur Farre has defined it as "a continued fever, communicable by contagion, occurring in women after childbirth, and often associated with extensive local lesions, especially of the uterine system." He admits, however, as indeed he could not fail to do, that this definition practically defines nothing, for to say that puerperal fever is a continued fever occurring in women after childbirth, is in reality only saying that puerperal fever is puerperal fever. At the same time, I do not see that any general definition can be more accurate or precise, for it is only when we come to specific cases that accurate description is attainable. As Dr. Priestley very truly says, "The definition may well answer the purpose, if only it be borne in mind that in this sense puerperal fever is a comprehensive term, including a diversity of puerperal febrile affections, and that it does not express any theory or doctrine as to their pathological nature. In this respect it differs essentially from the definition of typhus or typhoid fever, and other zymotic diseases, which have characteristic symptoms, well-defined pathological appearances, and are believed to be always produced by the same specific poison." In this remark I entirely concur, but I cannot help adding, that "a comprehensive term" which includes such a "diversity of puerperal febrile affections," becomes practically valueless, and might with advantage be altogether abolished. The "diversity of puerperal febrile affections" would then, I think, be much better studied, we should get greater accuracy of nomenclature, and the "febrile affections" themselves would be better appreciated, and probably better treated. I would prefer to have the term puerperal fever altogether abolished, and call the diseases which the term includes by their proper pathological names. But until there is a general consensus of opinion on this point I must, though under protest, adopt the term, only I would wish it distinctly understood that it does include "a diversity of puerperal febrile affections."

With regard to the local effects discoverable after death, I have already said that in some of the worst cases of so-called puerperal fever, no inflammation exists, and little, if any, pathological lesion is found post-mortem. In some cases, it is true, there is evidence of commencing inflammation, but a change in the condition of the blood is that which chiefly attracts attention, though unfortunately no means have hitherto been discovered for determining the nature of that change. In many respects it resembles that found in severe cases of typhoid fever. There is a decrease in the number of red blood-cells and an increase in the white cells, the fibrin is also increased, at least at first, but the solids generally are diminished. The extractive matter is increased, as is also the amount of lactic acid and fat. Moreover, there are often traces of bile pigment, and the late Mr. Moore said that he discovered a "black precipitate" in the blood of a person who had died of this disease, and that there was "a peculiarly offensive odor occasionally arising from it."

The same thing has been observed by Dr. Stevens in bad cases of typhoid fever. "When first drawn," he writes in his work *On the Blood*, "it has a peculiar smell, and coagulates almost invariably without any crust. There are black spots on the surface of the crassamentum; the coagulum is so soft that it can easily be separated with the fingers, and during its formation a large quantity of the black coloring matter falls to the bottom of the cup." Dr. Tweedie observed similar changes. The clot found, he observed, was small and soft, "resembling in consistence half-boiled currant jelly."

That the phenomena characterizing what may be termed perhaps the contagious or epidemic form of puerperal fever are caused by the absorption into the blood of some animal or other organic poison, there can, I think, be no doubt, nor is it reasonable to suppose that the vitiated state of the blood is the secondary link in the chain of phenomena: rather, as Dr. Stevens remarked, "This morbid condition of the blood is decidedly the first link in the chain of those phenomena which constitute fever, for even before the attack every drop of the vital current is changed in its properties; and wherever this deranged blood can circulate, there fever extends its empire; for the cause which produces this disease is not confined to a part, but acts on every fibre and in every tissue of the living system; it disturbs every function of the body, and deranges every faculty of the mind."

Dr. Ferguson adopted precisely the same view, but he classified the different inflammatory forms of puerperal fever under the same category, their varieties being due to the different modes in which the blood poison spent itself. In one case, for instance, the blood poison would set up an inflammation of the peritoneum, while in another it would seize upon the liver, "the organ through which, as the experiments of Gaspard and Fontana, and the admissions of all physiologists show, most poisons received into the system endeavor to escape." In the former case we should get what he called the peritonitic or inflammatory, in the latter the gastro-enteric form of puerperal fever. Locock, Rigby, Simpson, and others entertained similar views.

Now it is obvious that this view regards puerperal fever as a distinct specific disease; but if there was one fact that came out more clearly than another in the somewhat discursive debate that recently took place at the Obstetrical Society of London, it was I think this, that there is no such thing as a specific puerperal fever, and though probably a morbid condition of the blood is the very essence of the epidemic or contagious form of puerperal fever, we know little or nothing of the exact nature of that morbid condition, and can only guess at the manner in which it is produced. Probably, too, any inflammation which may be present is to be regarded rather as an accident, so to say, and is not by any means a characteristic of the disease. The question then arises, How is it that this kind of fever presents at different periods and in different places where it rages epidemically such very diverse phenomena, and is moreover variously affected by the same remedy? The answer formerly given to this question was, that *the difference is one of type*, and it was thought that this was very clearly seen in the record of some 400 cases of puerperal fever which occurred in the General Lying-in Hospital between the years 1833 and 1858, an account of which was published by Dr. Tilbury Fox in the third volume of the *Transactions of the Obstetrical Society of London.* Here, though the symptoms recorded were of the most opposite character, the general conclusion at which the author arrived with regard to the nature of so-called puerperal fever was, that the disease is very closely related to, if it be not identical with erysipelas. In 25 of these cases, the blush of erysipelas was notably present.

At this same hospital, Dr. Rigby was struck with the remarkable difference observable in the epidemics of different years. In 1826, the cases were all of the inflammatory character, and were successfully relieved by bleeding, hot poultices, a mercurial purge, and occasional applications of leeches; but during the following years an epidemic of a highly malignant character spread destruction rapidly among the patients, setting at defiance the treatment previously employed. In another epidemic, which Sir C. Locock described, the type and character of the disease was, he thought, completely changed *in six weeks.* It was at first of the acute inflammatory kind, bearing depletion very well; but ultimately the fever was attended with marked depression and debility, and in many cases purulent deposits took place in different parts of the body. The same variation has been observed in the epidemics which are common in the large Continental Lying-in hospitals.

As bearing upon this question of a difference in type, it may be remarked that it has generally been observed that coincident with an epidemic of so-called puerperal fever, epidemics of other zymotic diseases were also raging; those most common being erysipelas and typhoid fever. So close, indeed, has been the connection in some cases, that many have regarded puerperal fever as identical with these diseases, and a very interesting point has been noted by Dr. Churchill, namely, that the infants of women attacked by this form of puerperal fever are very liable to erysipelas or diffuse inflammation. No doubt many facts may be adduced in support of the opinion that these diseases are but different manifestations of one and the same blood-poison, influenced probably in different ways by the circumstances of the patients. The late Sir James Simpson sought to establish the identity of puerperal and surgical fever, as the latter occurs after great operations. Both, he said, consist of a combination of coexisting acute fevers and acute internal inflammations; their similarity is seen in a remarkable manner by observing the identity of the pathological lesions found after death in the case of surgical operations on the pelvic organs as compared with those found in puerperal fever. What these are I shall describe further on. There is no relation between the intensity of the fever and the amount of local lesion, for the former is in no way a result of the latter, but both are the effects of one common cause, that cause being some toxic or diseased condition of the circulating fluids.

I have already alluded to the frequently *epidemic* character of this disease, and there is no doubt that atmospheric conditions have much to do both with the origin and spread of some forms of so-called puerperal fever; they generally rage more virulently in hot, damp, and wet weather, than when it is cold and dry. Much difference of opinion was expressed at the debate already referred to in regard to this question of the relation of puerperal fever to zymotic disease. I have already expressed my dissent from the opinion that the various zymotic poisons, such as scarlet fever, for instance, lose their identity in the presence of the lying-in woman. I cannot agree in the opinion expressed by Drs. Arthur Farre, Barnes, and Braxton Hicks, that scarlatina poison is prone to produce what has been called puerperal fever, or a form of scarlet fever so wanting in its usual characters as to be unrecognizable; when that is the case, I think there is no evidence whatever to show that the fever has any relation to the poison in question. Of course, if the term puerperal fever is not meant to convey any specific meaning, but, as Dr. Priestley says, includes a diversity of puerperal febrile affections, then obviously any blood-poison may produce one of these many "puerperal febrile affections;" and there is abundant evidence to prove that not the exanthematous poisons only, but also those of erysipelas, diphtheria, typhus, and typhoid fever will very easily and readily occasion a "puerperal febrile affection," of a more than ordinarily grave character.

As to the question, whether or not this so-called puerperal fever is really *contagious*, most authorities agree, I think, in believing that at least the worst forms of it are essentially contagious; by this I mean that the poison, whatever it be, whether derived from another puerperal fever case, from erysipelas, scarlatina, diphtheria, or from typhoid fever, can be carried from one person to another, and this either by actual contact between an infected and an uninfected person, or by a third person, as in the case of the hand or clothes of the attending practitioner. Dr. Robertson, of Manchester, has indeed recorded a remarkable instance of the contagious character of at least one form of puerperal fever. A midwife attended twenty cases of labor in one month: sixteen of these died of puerperal fever. In the same charity 380 cases were attended by other midwives at about the same time, and not one of these was attacked by this disease.

There is also ample evidence to show that poisonous matter may be carried from the post-mortem room, from bodies not having died of any kind of fever, and may give rise to a certain kind of puerperal fever; still more likely would this be if the body on which the post-mortem examination had been made had died of this disease. So subtle, and yet so pertinacious do these poisons appear to be, that they will sometimes follow a practitioner about and track his course from house to house in a most remarkable manner, even though the distance he travels may be several miles; nay more, they have been known to hang by him so closely that no change of clothes, and no bathing even, has been able to rid him of them.

On the other hand, as if to increase still more the mystery of this question, there are physicians of great eminence who altogether dispute this theory of contagion, who have in a long life of active practice attended many thousands of cases, have gone in the midst of epidemics of puerperal fever, have been at the bedside of women dying of the most malignant fevers, and have performed post-mortem examinations on the bodies of those dying from it, without at all ceasing to discharge their ordinary professional duties, and yet they can say that they "have never conveyed the disease from place to place in any single instance." Truly this is a remarkable fact, but it certainly cannot be taken as the rule, for be the explanation what it may, no doubt can exist in the mind of any one that contagion is something more than a theory, especially in the history of these puerperal fevers; and that man will be the most prudent who is also the most cautious to avoid anything which may give an occasion for the spread of so dire a malady; indeed, to be careless in such a matter is little short of criminal.

But, while I cannot doubt that puerperal fever is essentially contagious, it must be admitted that some forms or varieties of this disease are much more contagious than others. Dr. Barnes believes that what he calls the autogenetic forms, that is, those which are engendered by the patient herself, independently of any morbific influence from without, do not appear to possess the active powers of propagation. Dr. Braxton Hicks holds the same views, and he thinks the zymotic forms of the disease are by far the most infectious. In all this I entirely concur; and if this be true, then it behooves us all to be extremely careful against carrying any infection from one person to another.

Another question which may now be considered is the condition of the lying-in patient with regard to the absorption of noxious matters—in other words, the mode by which puerperal women become infected. There are manifestly several ways by which this may be effected; and, as Dr. West truly remarks, "there is not one single solitary cause to which we can refer the symptoms of puerperal fever; that it occurs now from one cause, now from another." First, the poison or poisons may be lurking about in the atmosphere and may be carried into the circulation through the lungs, just as other animal poisons are taken up. Secondly, the same poisoned atmosphere coming in contact with the generative mucous tract, may in a similar way be carried into the circulation. Thirdly, the examining finger may carry with it the fatal poison. And lastly, a portion of membrane, placenta, or even of coagulum, being retained in the uterus, may there undergo decomposition, and rapidly charge the healthy fluids with a self-generated poison. All these, which are no mere theories, but truths which sad experience has confirmed, testify to the paramount importance of cleanliness, not only in all the *matériel* of the lying-in room, and pre-eminently of the lying-in ward, but also in the very atmosphere by which the patient is surrounded. It is not uncommon to see the most scrupulous cleanliness in all that can be *seen*, associated with the most abominable filth in that which cannot, I mean the air; and here I would quote from a very old treatise on childbed fevers by Dr. Kirkland, a passage which should always be present to the mind of an accoucheur: "I have sometimes been called to women in childbed, where the offensive *effluvia* arising from this kind of evacuation (lochia) pent up in a small close room, at once evinced to what cause their fever was owing; and though I have not any doubt but in lying-in hospitals every attempt is made to preserve the air pure and the patient in a state of cleanliness, yet where many women lie in the same ward, it is perhaps impossible to obtain these advantages in the perfection to be wished."

That a puerperal woman should be thus liable to these attacks of fever, arising solely from absorption of putrid matter, need surprise no one who remembers what is the condition of the interior of the uterus after delivery. "All the uterine veins and arteries have been torn from the placenta, and they form a part of a large wound, and are therefore bathed in all the secretions which necessarily take place while this wound is healing. In this respect the uterus presents an exact analogy to the surface of an amputated stump; and it is therefore not surprising that the secondary evils of amputation should be so similar to those of the puerperal state." We might reverse this latter clause of M. Cruveilhier. Further on he says: "As in amputation, a false membrane covers the stump and precedes cicatrization, so the inner surface of the womb is first covered with a false membrane before it is cicatrized." "Ordinarily this false membrane is thrown off with a purulent discharge, which is the lochia. At first it is sanious—*i. e.*, mixed with blood and fetid; then less fetid and more purulent; then thin and serous. The quality and quantity of the discharge are, as in amputations, an index of the state of the wound." And the practical obstetrician knows full well how true is this last remark in the case of the lying-in woman; there can be no doubt that healthy lochia can only flow from a healthy uterine surface, nor is the converse less doubtful.

Dr. Snow Beck advocates very strenuously the view that the poison of puerperal fever is taken up by the uterine veins and sinuses, and that the pervious condition of the sinuses is owing to the want of that firm and persistent contraction of the uterus after delivery which is necessary to effectually close those canals and prevent all circulation of fluid in them. Hence the primary, though not the only object in the prevention of these attacks of puerperal fever will be to preserve a firm, complete, and persistent contraction of the uterus after the birth of the child. Dr. Beck seems to believe that puerperal fever is next to impossible if perfect contraction of the uterus is uniformly maintained, and he strongly controverts the view which is very generally held, viz., that exposure of the puerperal woman to the poison of scarlet fever, typhus, erysipelas, etc., is likely to engender puerperal fever; on the contrary, he affirms that these being specific poisons, remain so still, and that the puerperal woman has no power to change them in her system to any other. On the other hand, no less authorities than Drs. Tyler Smith, Hall Davis, Barnes, and Braxton Hicks, affirm their belief that such diseases as erysipelas, typhus, scarlatina, small-pox, hospital gangrene, putrid sore throat, diphtheria, the post-mortem and other poisons, are excessively prone, if brought near the lying-in woman, to originate puerperal fever. In support of the view that the puerperal state does modify zymotic diseases, Dr. Playfair relates the experience of the Nightingale Lying-in Ward at King's College Hospital, where on one occasion during an epidemic of erysipelas in the surgical wards of the hospital, "the two most recently confined women were attacked with a very adynamic form of puerperal fever, which proved fatal in both instances." "There could be no doubt," he adds, "that the cause of the disease was the same as that which was producing erysipelas in the surgical wards. There was, however, no trace of erysipelas, as such, in the puerperal cases, and the natural inference was that the action of the poison was modified by the state of the patients." It appears to me, however, that this is one of those cases in which the Scotch verdict of "not proven" may fairly be applied, for the whole assumption rests upon purely negative evidence, and while I agree with Dr. Snow Beck, that a flabby, badly contracted state of the uterus predisposes to the absorption of poisonous matter, I yet cannot accept his conclusion, that a firmly contracted uterus is proof against puerperal fever.

On the other hand, I agree with him in thinking that it is not sound pathology to group under the one heading of puerperal fever, all the cases of febrile disturbance, however grave or mild, which occur in puerperal women, as the apparent result of the contagious influence of a great variety of zymotic poisons; these must, in my opinion, remain specific poisons under whatever influence they are brought, and it is contrary to all analogy to suppose that the puerperal women has any inherent power to convert them into any other; there is no authentic parallel to such a supposed power in any other condition of health or disease, and I am at a loss to understand why such a power should be imputed in the present instance. As Dr. Snow Beck says, "Potent indeed must be the influence of the natural process of pregnancy or parturition that can so transform all these acute specific diseases into one and the same malady."

In thus contrasting the opinions advocated by the authorities above named, I would limit my objections only to the case of specific zymotic poisons: that puerperal women are peculiarly prone to take these poisons I am fully convinced, whether the uterus is contracted or not, but I contend that their specific character is not altered, though in some particulars there may be departures from the ordinary course of these diseases.

There are several important pathological lesions discoverable after death, which, though they are none of them peculiar to the puerperal state, are nevertheless so frequently associated with it, that some short account of them seems fitting in this place. Of 500 fatal cases of puerperal fever, recent inflammatory changes were noted in the interior of the uterus in 372 cases, in the veins of the uterus 349, in the peritoneum 321, in the lungs and pleura 202, in the lymphatics 129, in the ovaries 78, in the cellular tissues and muscles 46, in veins other than uterine 40, in the brain and its membranes 23, in the spleen 21, in the vagina and pudenda 19, in the bones and joints 18, in the kidneys 17, in the stomach and bowels 13, in the pericardium 12, in the mamma 7, in the Fallopian tubes 5, in the bladder 4, in the parotid gland and heart substance 3 each, in the endocardium 2, and in the iris, tonsil, and larynx and trachea 1 each (*Simpson*). It is very seldom that inflammation is limited to any one of the organs or tissues above mentioned. Sometimes the peritoneum alone is attacked, but much more frequently several parts are undergoing the same morbid action.

The death-rate of puerperal fever is unhappily a very high one, even in the simple inflammatory varieties, while in the malignant, adynamic, contagious, or what I suppose we may call the zymotic form, comparatively few of those attacked recover. During one epidemic at the British Lying-in Hospital, in the time of William Hunter, "in two months thirty-two patients had the fever, and only one of them recovered." Very often the death-rate diminishes towards the close of an epidemic, as it does in other zymotic diseases.

In considering the *varieties of puerperal fever*, it will be convenient to study them in some order, and the classification which was originally adopted by the late Dr. Douglas includes, I think, all the varieties which need here be described. In the discussion which recently took place at the Obstetrical Society of London, to which reference has already been made, there seemed to be a general opinion that three varieties of puerperal fever might be recognized—viz., as Dr. Priestley puts it—First, the ephemeral forms, which depend on some transient cause; and secondly, the graver class, divided into, 1, the antagonistic or auto-infective form, and 2, the heterogenetic or hetero-infective, in which the poison is imported from some zymotic or other infective source, and the origin of which can be traced. This seems to be a rational classification, but at the same time it may be observed, that it refers rather to the variety of causes than to the special clinical characteristics of those varieties. Viewed in this latter and more practical aspect, the following, as described by Dr. Douglas, seems to me a convenient classification both for study and practice.

First, there are those cases which are characterized by the presence of acute inflammation in some important part of the generative system, there being no special blood-poisoning, but only such general febrile or constitutional disturbance as results directly from the local inflammation.

Secondly, there is a variety in which no inflammation exists, at least as a primary condition, but in which the symptoms clearly indicate the absorption of an animal poison into the blood. This absorption may have taken place either from the uterus or by the lungs, producing symptoms of a malignant typhoid character, rapidly prostrating the powers of life, and destroying the patient almost before there is time for the inflammation to set in. This is the specially contagious, zymotic, or malignant form of puerperal fever. It corresponds with the second or graver class mentioned above, and it is obvious that the poison in question may be either absorbed from without, the heterogenetic or hetero-infective; or it may be generated within the patient and absorbed afterwards from the generating surface, as in the case of a putrefying clot or portion of the placenta or membrane when retained within the uterine cavity.

It is most important that these two varieties should be steadily kept in view, otherwise the most serious mistakes may be made in practice.

Thirdly, there is another variety, which has been described under the term gastro-enteric, or gastro-bilious, in which the symptoms refer chiefly to the digestive system, and where there are manifest indications of gastric derangement. This is not by any means a fatal variety, and it is not usually accompanied by any inflammation, though, if neglected, it may assume a typhoid character.

Lastly, though it cannot be considered as a variety of puerperal fever, it may yet be convenient to describe a condition which might at first be mistaken for that disease, and to which the term false peritonitis has been given. According to the late Dr. Rigby, it "appears to depend upon a high state of nervous irritability, perfectly independent of inflammation or any other affection of the peritoneum."

I. INFLAMMATORY FORM OF PUERPERAL FEVER.

Under this head is included not only the puerperal peritonitis of Locock, but also uterine phlebitis and metritis or hysteritis, or indeed any form of inflammation affecting either the uterus or its appendages. In all these the general symptoms bear a great resemblance to one another, the chief differences having reference to the organ or tissue which is the seat of inflammation; they are mostly characterized by symptoms which are sufficiently well marked; and, unlike the contagious variety, they do not result from the absorption of any animal poison: acute inflammation is the one special and original characteristic; it is the *fons et origo mali*, and if there be any blood-poisoning it is the result and not the cause of the mischief, for by the severity of the local inflammation, secretions and exhalations may become putrescent through the loss of a kind of vitality which even they possess, and thus septicæmia or pyæmia may result. So that what was originally merely a case of the inflammatory variety may ultimately merge into one of the specially contagious or autogenetic class; for I cannot doubt from my own observation and from the analogy of purely surgical cases, that it is quite possible for a case to start as a distinct inflammatory disease, entirely unconnected with any specific zymotic or contagious poison, and yet as the inflammation progresses a low typhoid condition is developed from which poisons the most contagious and the most virulent may emanate, and thus what was originally simple uncomplicated local inflammation may become a specific contagious disease—specific at least so far as this, that it may be communicated to another, and may give rise to symptoms identical, or nearly so, with those from which the original propagator is now suffering.

Symptoms.—In the peritonitic form, where the inflammation is in some way due to the labor, the symptoms usually begin very early after delivery. The patient complains at first of feeling sore about the lower part of the abdomen, and there is a good deal of tenderness on pressure: the pain is of a continuous character, thus differing from the pains characteristic of what are called "after-pains," though it is aggravated at times, and especially by any movement of the body; gradually this pain increases in severity and extent, the patient is unable to move at all, and to save herself the pain which stretching the abdominal muscles occasions, she lies with her legs drawn up; there is also a peculiar pain about the umbilicus, as if it were being forcibly drawn inwards. As these symptoms increase, the general constitutional disturbance also increases; there are occasional rigors: the pulse is quick, varying from 120 to 160, generally small and wiry; the temperature may run up to 102 or 105; the skin is hot and dry; the breathing is quick, short, and jerking, thoracic in character, the abdomen moving very slightly; the tongue becomes dry and coated, very red at the tip, brown at the back. After awhile the abdomen swells, at first it may be from a tympanitic condition, but afterwards it results from fluid effusion, while the pain and tenderness become most excruciating; now there is hiccough, then nausea and vomiting of mucus or of bile, or of a peculiar coffee-grounds-looking fluid; the lochia may either continue as usual, or, which is much more frequently the case, they are diminished; the secretion of milk is generally suppressed; the bowels are usually confined, probably from paralysis of the muscular coat; sometimes, though rarely, there is diarrhœa; the urine is thick with lithates, scanty, and high-colored.

When the case terminates fatally, delirium of a low, muttering character sometimes supervenes, the face assumes an anxious, pinched expression, hectic comes on, the sensibilities are deadened, the skin is cold and clammy, the pulse becomes exceedingly small, feeble, and so frequent as to be quite impossible to count, and death from exhaustion closes the scene.

These are the symptoms most generally to be found, but they are by no means invariably present; for instance, there may be very little pain, no delirium, no great heat of surface, and not much inflammatory reaction, the symptoms being more of an asthenic character; much no doubt depends on the prevailing type of the epidemic, on the constitution of the patient, the season of the year, and the atmospheric conditions.

If the *uterus itself be the seat of inflammation*, other phenomena are observable; the inflammation may either extend to it from the peritoneum, or what happens much more commonly, it begins in the uterus and extends to the peritoneum. In this case the symptoms usually begin early after delivery, and they come on very suddenly. There is a severe fit of rigors, followed by intense headache; sometimes, but not always at first, pain in the abdomen, with tenderness on deep pressure of the uterus, which is felt to be greatly enlarged; considerable constitutional disturbance of a highly inflammatory character sets in, and as the disease soon extends to the peritoneum the symptoms are then very much those of ordinary puerperal peritonitis. Dysuria is a frequent symptom.

In rare and exceptional cases the disease is subdued, and the patient recovers; sometimes an abscess forms somewhere in connection with the uterus, and sometimes, though very rarely, gangrene or sloughing takes place.

Occasionally *the uterine appendages* are the seat of inflammation, involving either the ovaries, the Fallopian tubes, or the broad ligaments. In these cases there are the same general phenomena as in the ordinary peritoneal form, but they are usually less severe, and the pain when present, is confined to one or other side, where also there will be found tenderness on pressure. A vaginal examination will show, probably, that the uterus is not unduly sensitive, but there will be tenderness on one side, with, perhaps, some swelling or even fluctuation in that part, for suppuration is not an uncommon event in these cases, especially when the broad ligament or ovary is the part affected.

Where *the veins of the uterus* are inflamed (uterine phlebitis), the symptoms generally commence suddenly, and often within a few hours after labor. They begin with rigors, followed by headache, suppression of the lochia and milk, quick pulse, hot skin, a dry brown tongue, thirst, and vomiting. There is generally little or no pain in the abdomen, unless the uterus is firmly and suddenly pressed. The symptoms which follow are referable to the absorption of pus into the circulation, and they are usually of a more aggravated character than is common to the other forms of inflammatory puerperal fever. There is scarcely an organ in the body which may not become affected in some way—the lungs, liver, kidneys, and joints may all be the seat of inflammation and abscess.

The only remaining structure which is liable to specific inflammation during the puerperal state is the *uterine lymphatic system*. This is exceedingly rare, and, according to Dr. Churchill, "the local symptoms are very obscure, and the constitutional ones quite as severe as in uterine phlebitis, and in the present state of our knowledge, not to be distinguished from them. The secondary lesions also resemble those in phlebitis."

When a fatal issue supervenes, the period at which death takes place in any of the above forms varies a good deal in different cases, and is subject to many conditions—to the exact nature of the attack, to the habits and constitution of the patient, to the time of the year, the nature of the epidemic, if any, and in some degree to the kind of treatment pursued. In the peritonitic form it varies from the third to the eleventh day of the attack: it is more frequent on the fifth or sixth day. Where the uterus itself is inflamed, it generally assumes a much more severe character, and runs a shorter course; while in the case of phlebitis, though patients sometimes die quickly, this is certainly not common, and they generally linger on for some time, during which secondary abscesses form in various parts, and the patient ultimately succumbs to exhaustion.

The post-mortem appearances vary a good deal, as might be expected, according to the character and seat of the inflammation. In some the peritoneum only is affected: it may be found everywhere congested, or it may be so only in patches. Sometimes it is pretty generally covered with lymph. The intestines and the other viscera may be adherent to one another, or a few patches of lymph only may be seen here and there. In some cases there is a good deal of effusion, the fluid being either serum, or serum mixed with a variable quantity of lymph, or it is sero-purulent or even sanious.

In other cases the uterus is found to be the seat of the inflammation, its tissue is soft and infiltrated, and its peritoneal surface covered with a coating of lymph, "as if it had been smeared with a quantity of dirty-white paint;" pus is sometimes found behind or beside it. The organ itself is enlarged, and occasionally pus is found in some of its interstices. Lymph may be seen on its inner surface, but according to the late Dr. Ferguson, the point of insertion of the placenta is the most ordinary seat of all uterine lesion, whether of abscess, softening, or phlebitis; the next point, the large and congested lead-colored cervix uteri.

If the uterine appendages have been attacked, these will be found in various conditions; sometimes the ovaries, Fallopian tubes, or ligaments are swollen, softened, and infiltrated, their tissue deeply congested; occasionally pus is found in the Fallopian tubes, and sometimes in the substance of the ovaries, which are in some cases enormously enlarged, and become in fact the seat of an abscess, which may burst either into the abdominal cavity, as I have known in one instance, or more frequently the matter is discharged per vaginam or per rectum. Lymph will generally be found effused in and around these viscera, matting them all together. Occasionally the broad ligaments alone are the seat of abscesses.

In the case of uterine phlebitis, the changes observable may either be limited to the uterine veins, or they may extend to those of the contiguous organs. Those situate on the side to which the placenta was attached are usually most affected. On splitting open the larger veins they will generally be seen to be highly inflamed and congested, sometimes they are filled with coagula, and sometimes with lymph or pus. The uterus is large and soft; deposits of pus have been found beneath its peritoneal covering, or in the proper muscular tissue of the organ; and in many cases, on cutting into its substance pus has appeared in numerous little points, oozing from the veins or absorbents which have been divided. Where the disease has extended to other veins, the spermatic, the hypogastric, the renal veins, or the vena cava, are those mostly influenced.

Though the symptoms of each of the above varieties have been detailed, yet when we come to the question of *Diagnosis* it is very difficult to define with precision those which may fairly be regarded as pathognomonic of the several states. In the peritoneal variety the fever is of the irritative kind, and differs in no essential respect from that known as milk fever, but generally the latter is less severe, as it is certainly of less duration, and it is also unattended by abdominal pain and tenderness, which are characteristic symptoms of the former. This pain might perhaps be mistaken for after-pains, but it differs from them in being more severe, more continuous, and is less amenable to treatment. It also increases, while the latter diminishes, day by day. The tenderness of the abdomen is sometimes very great, and of course the general dyscrasia is much greater in one case than in the other.

In inflammation of the substance of the uterus (metritis) the chief points on which the diagnosis rests are, the greater constitutional disturbance and the comparative freedom from pain and tenderness, except when such firm pressure is made as actually to touch the uterus itself, which is then found to be extremely sensitive; whereas in peritonitis the slightest pressure on the abdomen gives intense pain. In metritis the symptoms often speedily assume a typhoid character.

When the uterine appendages are affected, there is generally some particular spot on one or other side where the patient complains of most pain, and where tenderness on external pressure is greatest. This will also correspond with the evidence obtained by vaginal examination.

In uterine phlebitis the diagnosis is more difficult, indeed it can seldom be made out until, by the absorption of purulent matter, secondary abscesses begin to form in other parts. There can then be little doubt that the veins are inflamed, and with this there are the general symptoms of pyæmia, which generally are very well marked. But here I cannot forbear to remark, that though we often hear of the absorption of pus giving rise to all kinds of horribly fatal phenomena, it has never yet, I think, been clearly established that the presence of pus in the blood, provided it be healthy, is really so fatal a thing as is generally supposed. The idea that pus-cells are taken up at one place and deposited in another, and so produce secondary abscesses, is all very well in theory, but I repeat it has never, so far as I know at least, been proved as a fact, nor can I see how such a theory is to be substantiated even by argument. It seems to me, therefore, that the description given by Sir James Simpson of the way in which these secondary abscesses are formed is much the more correct. "Either, firstly, they are due to a vital obliteration or destruction of the part, resulting from the impaction of some material in the afferent bloodvessel, which has been brought from the veins at the seat of the injury, and been here arrested or filtered out; or, secondly, they may be produced by the missecretion of some finer material which we have no physical means of recognizing, and which in its effects and irritant mode of action has more affinity with chemical substances. There is, if I may so express it, a mechanical or physical and a chemical or secretory metastasis." The starting-point of the secondary local disorder from mechanical causes is, as Virchow has demonstrated, the formation of a thrombus or clot in one of the smaller vessels, artery, or vein, of the part; the supply of blood to that part is arrested, and blood is effused into the neighboring tissues: as a consequence of this, either the part becomes indurated and degenerates, or inflammation and gangrene supervene.

In the chemical or secretory process the morbid condition of the blood probably produces, in the first instance, "a missecretion or elimination upon the inflamed surfaces, or at the inflamed spots, of morbid materials existing in the blood, and capable, when thus localized, of lighting up acute inflammatory action by their presence as local irritants."

Treatment.—There are few diseases, perhaps, about the treatment of which more has been written and said than of so-called puerperal fever, and it is to be feared, in many instances, the practice of medicine has been but little advanced thereby. No doubt this may be due to a somewhat faulty view of the pathology of this affection, though this applies less perhaps to the form I am now considering. But so long as the medical world is distracted and divided upon the great question of how best to treat acute inflammatory diseases, so long must the treatment of these forms of puerperal fever be governed by the diverse views of different practitioners; for while one recognizes it as his duty to attempt to cut short inflammation by active antiphlogistic remedies, bleeding, blistering, calomel, and purging, another sees it to be his duty rather to watch the patient through the progress of the disease, to support her strength against the inroads made upon it by the morbid processes, and generally to treat any special symptoms which may arise.

I must confess that my own experience has led me to adopt the latter course. And therefore, though I feel that in this place I ought to give the treatment in most general use its fair place, yet

I in no way go along with what is called the antiphlogistic régime, nor can I give any recommendation for its adoption.

In the early stages of the disease we should endeavor to quiet the nervous system by opiates, moderately to excite the bowels to action by some saline purge, if there be any indications of gastric derangements with fecal accumulation, and to stimulate the skin to gentle perspiration by small doses of carbonate of ammonia, or other so-called stimulating diaphoretics. Local applications to the abdomen, in the form of poultices, applied often, so as to keep the part warm and moist, will also be of service, and to these may be added opium in the form of one or two teaspoonfuls to each poultice.

As soon as the reactive phenomena of inflammation are well marked, recourse may be had to leeches applied over the abdomen to the number of six, eight, or more, according to the condition of the patient as to plethora: some prefer venesection from the arm, but of this practice I can say nothing from personal experience. I can, however, testify to the good effect of leeches, whatever may be their *modus operandi*, for I have often had recourse to them, and generally with the best results, especially where it is the peritoneum only which is the seat of disease, and the pain is severe; from six to twelve leeches is the number I generally order.

Where venesection is resorted to, the amount of blood which it is thought necessary to draw must be determined by the state of the pulse and the strength and vigor of the patient's constitution. If the pulse be full, quick, and bounding, twelve to twenty ounces are recommended, and the blood should flow *pleno rivo* from a free opening. In this way it is said that the "effect upon the circulation is produced in a much shorter time, and with less expenditure of blood, than if the blood had been slowly dribbled from a small opening." This should be done while the patient is in a more or less upright posture, so that the approach to, or actual state of, syncope is produced, and in this state she should be kept for some little time. After the bleeding nauseating doses of tartar emetic are recommended, with the view of lowering the force of the heart's action; and if there are still symptoms of reaction, if the pain which had been relieved by the remedies returns, and the pulse again becomes hard and full, the bleeding may be repeated, and if necessary it may be repeated again and again till the disease is subdued. This is the practice recommended by many high authorities. As soon as a notable effect is produced by the depletion, calomel and opium are directed to be given freely, in order that the system may be brought under the influence of mercury as quickly as possible, especially where the peritoneum is the seat of inflammation. Mercurial frictions are also recommended.

Another remedy which has been tried, and apparently with success, at different times, is turpentine in half-ounce doses, two or three times a day, in a little sweetened water or mucilage. It appears to do good where there is much tympanitis; but though some have regarded it almost as a specific, others have found it of no avail. Emetics have succeeded with some, with others they have failed. Dr. Ferguson considered them useful "when the violence of the malady has fallen on the liver, especially, and when there is early nausea and spontaneous vomiting." Purgatives were recommended by Denman; but one can scarcely understand in what way they are supposed to act beneficially, for it might, on the contrary, be supposed that keeping the bowels quiet would be the best practice. Blisters, turpentine stupes, mustard cataplasms, and fomentations are all serviceable, and benefit will generally result from warm-water injections into the vagina.

The above may be taken as fairly representing the kind of treatment usually recommended in the various forms of inflammatory puerperal fever; and though the seat and degree of inflammation may differ very much, the general principles of treatment adopted are the same, differing only in the degree to which they are exercised. As a rule, inflammation of the uterus itself, or of its veins, is of a more asthenic or typhoid character than inflammation of the peritoneum; in these cases therefore the antiphlogistic régime will not be borne so well. The uterus should be freely cleansed with warm-water injections, to which some disinfectant, such as Condy's fluid or carbolic acid, may be added; and the patient may be placed occasionally in a partially upright position, in order to allow of the extrusion of any coagula or other discharges; poultices should be applied to the abdomen; and care must be taken to increase the action of the excretory functions by such drugs as calomel, James's or Dover's powder, and saline aperients. If there be much pain Dover's powder should be given frequently, and at the same time the patient's strength should be maintained.

I have before expressed my dissent from the so-called antiphlogistic principle of treating acute inflammatory disease; the plan therefore which, to my mind, offers the best chance of success is the following: To support as much as possible the powers of the patient by a *moderate* use of stimulants, wine or brandy, in quantities proportioned to the urgency of the case, a hot, dry skin being regarded as a contraindication to the use of all stimulants; to administer light but nutritious diet; to apply counter-irritation and warm emollient applications, both per vaginam in the form of injections and externally in the shape of poultices, to either or both of which opium should be added. Cleanliness should be especially enjoined, both in the atmosphere, in the clothes, and in the uterus itself. As drugs, the diffusible stimulants, opiates, saline aperients, diaphoretics, and vegetable tonics, so soon as the acute symptoms have passed off, are those to which I should attach most importance. If the temperature is very high, the pulse quick, full, and hard, the skin hot and dry, I know of no remedy at all comparable with aconite. It should be given in small and oft-repeated doses: my own rule is one minim with a teaspoonful of water every hour. This may be combined with saline diaphoretics, and the result will generally be most satisfactory.

II. CONTAGIOUS, ZYMOTIC, OR MALIGNANT PUERPERAL FEVER.

In whatever shape this occurs, and whatever the poison from which it takes its origin, this is one of the most fatal maladies, or perhaps I ought rather to say, in view of the opinion I entertain as to their diverse origin, these are the most fatal maladies which affect the lying-in woman; but happily in its worst and most malignant form it is now very seldom met with, owing, no doubt, to the generally improved sanitary condition of the country, and to the great advance which has been made in the science of hygiene in the last few years. Cases of this malignant type rarely occur except in an epidemic form, and they seem to be much more frequently met with in hospital than in outdoor practice. They may occur before as well as after delivery, and are in an especial manner caused by a vitiated condition of the blood. This, indeed, is the very essence of the disease, but the character of the blood-poison undoubtedly varies greatly. It may arise from any of the zymotic poisons, and may originate in the patient herself, or be brought to her from without, hence the two varieties already mentioned,—the autogenetic or the heterogenetic.

The *Symptoms* of the more serious form begin generally in the first two or three days after delivery, with a peculiar creeping, chilly feeling, but sometimes with a severe rigor, and followed quickly by general prostration of the vital powers, with extreme feebleness and quickness of pulse, and a greatly augmented temperature. The face turns pale, and assumes a heavy, anxious expression; the features are sunken and pinched, and occasionally the flush of hectic appears on the cheek; there is headache, great depression of spirits, and of the nervous power; the secretion of milk is arrested, the lochia are generally suppressed, the skin is covered with a cold clammy sweat, and the muscles generally become soft, flabby, and powerless. Sometimes the symptoms of collapse rapidly supervene, the circulation flags, the blood is improperly purified, the countenance becomes livid, the lips purple, and the general aspect of the patient resembles rather the condition of collapse in cholera. "She sinks without pain or complaint, beyond that of debility, but in such cases, with a rapidity which would almost claim for the disease the name of the plague." There is not often much disturbance of the mental faculties, but generally the sensibilities are so deadened that the patient makes few or no complaints; there is mostly very little, if any, abdominal pain or tenderness, but usually a good deal of distension, and very often purging, the matters ejected being highly offensive, watery, and resembling somewhat those of typhoid fever; the urine is small in quantity, thick, loaded with lithates, high-colored, and often albuminous; purpurous spots sometimes appear over the body and limbs, the vital powers sink lower and lower, drowsiness supervenes, and death results.

In some the symptoms are not quite so severe as this, but a kind of reaction sets in, and for a time the symptoms assume more of an inflammatory character; this, however, is generally only of short duration, and fatal exhaustion with collapse soon come on.

As regards the local phenomena, these are subject to considerable variation; peritonitis is not uncommon, but frequently there is little discoverable after death, the condition being essentially one of blood-poisoning, with few or no local phenomena. In very many cases there are no local symptoms whatever; the disease runs on to a rapidly fatal issue, the patient sinking in a kind of typhoid state from extreme blood-poisoning. When local disease does exist, as for instance in peritonitis, metritis, uterine phlebitis, etc., the symptoms of such conditions are always less strongly marked than when those states occur idiopathically as it were, and independently of the more serious blood-dyscrasia; the pain of peritonitis, for instance, is far less severe in this variety than in the idiopathic form, and the general symptoms of irritative fever which characterize the simple phlegmasias are much more pronounced than in this malignant form. On the other hand, the extreme depression which is almost pathognomonic of this variety is wanting in the former.

From the brief sketch of the symptoms given above it is evident that the disease in question is a very formidable one; and it is also clear that the symptoms vary a good deal—they seem indeed to vary much in different epidemics. One point, however, is quite evident, namely, that it is essentially a blood-disease; the general character of the symptoms sufficiently attests this fact, while the different degrees and kinds of local mischief point to their being of accidental origin.

The *duration* of the disease varies much. The great majority of the cases begin on the first or second day after delivery, and by far the largest number terminate fatally on the third or fourth day from the commencement of the attack.

The post-mortem appearances are, as I have said, by no means uniform. "When the patient is rapidly destroyed by the violence of the disease, the morbid changes bear no proportion to the severity of the previous symptoms; a dubious trace of inflammation, a little serum, or a few feeble adhesions, are all that dissection under such circumstances displays" (*Moore*). In many cases there is not even so much as this—indeed, there is nothing special except such as is caused by the poisoned condition of the blood, and the consequently defective nutrition of the several organs, which are seen to be soft, some of them pulpy and congested with dark venous blood. This is especially noticeable in the liver, spleen, kidneys, and lungs. Sometimes, however, where there have been during life symptoms of a reaction, the appearances met with after death show slight evidence of inflammation, but always of a very low type. There is, perhaps, some soft flaky lymph effused on the peritoneum; the ovaries and oviducts are highly congested, sometimes quite disorganized and infiltrated with sero-purulent matter; occasionally they have "entirely disappeared, their site being only discoverable by an oval thickening of the broad ligament, something like an empty cyst of peritoneum; this contained a small quantity of livid pulpy débris of the ovary." The uterus is found to be softened, its tissue disintegrated and infiltrated with serum. Occasionally, if the patient has survived long enough, secondary abscesses are found in different parts of the body; and in an epidemic which occurred in the General Lying-in Hospital, the eyes of several of the patients were seized with a kind of destructive inflammation. It began with intense pain in the eyeball, and in a short time disorganization came on, followed by suppuration, staphyloma, and bursting of the cornea.

The *Treatment* of this form of puerperal fever may be summed up in a few words, for unhappily there is too frequently no time for treatment, the vital powers so speedily succumb under the poisoned condition of the blood. Most authorities on this subject agree in the opinion that there is no known remedy for the disease. Dr. Clarke remarks that the "fatal termination is often so sudden that the time when medicine could be useful has often elapsed before it had been even known that the disease existed at all." It need hardly be said that bleeding, and all the other so-called antiphlogistic remedies, are completely out of place here; calomel still finds its advocates, and turpentine is recommended also, but bark, opium in very small doses, wine, and hot fomentations are more generally advised and practiced. In some cases where the prostration from the first is extreme, opium is rather contraindicated than otherwise. A liberal allowance of brandy is the remedy upon which I should feel disposed chiefly to rely, together with those drugs which contain a good deal of oxygen, such as the chlorate and permanganate of potash; the object being to endeavor, if possible, to supply oxygen to the blood, which is evidently deficient; in other words, to purify the blood. Bark should also be administered freely, in conjunction with the diffusible stimuli. Counter-irritation might be of service; and a dose of calomel to relieve the liver, or, better still, podophyllin in half-grain doses, together with some saline aperient, and large doses of ammonia, are the remedies which seem to be generally indicated. The vagina and uterus should be washed out most sedulously several times a day with tepid water to which a little disinfecting fluid may be added.

The late Dr. Rigby strongly recommended the use of calomel, given so as speedily to bring the system under its influence; that is, in doses of five grains every two hours at first, and this in combination with Dover's powder, to prevent purging. After two doses, he gave two grains every two hours with half a grain of opium. Saline draughts, with sal-volatile, are also given; and for the patient's ordinary drink he advised a solution of carbonate of soda and water. Ice is sometimes very beneficial: it checks vomiting, relieves the hiccough, allays thirst, and diminishes tympanitis.

Dr. Stevens recommended, in the malignant fevers of warm climates, a strong solution of common salt; the patient being directed to take as much as possible of it; and in several cases by other practitioners this remedy appears to have been successful in this form of puerperal fever. Dr. Rigby thought that after the mercurial there is "no treatment which holds out such rational hopes of success as the saline, based as it is upon the same principles on which it has been employed by Dr. Stevens." He, however, gave it with frequently repeated doses of soda, finding that the patient could not swallow the common salt.

Lately, the use of various remedies supposed to be disinfectant, anti-fermentative, or anti-contagious, has been recommended and tried with apparently good results. Dr. Snow Beck, for instance, says that when injurious impregnation of the general system has taken place, he has seen much good result from the administration of the sulphite of lime, or magnesia, in doses of twenty to thirty grains repeated every one or two hours, at the same time washing out the cavity of the uterus with a weak solution of the sulphite of soda, or any of the sulphites; the sulpho-carbolates of lime, soda, or magnesia, as advocated by Dr. Sansom, would probably also be beneficial in the same way.

III. GASTRO-ENTERIC PUERPERAL FEVER.

This is the last form of puerperal fever to be described, and its name pretty well indicates its leading characters. It is doubtful whether this should really be called puerperal fever, for it seems to be simply a derangement of the digestive organs, which might occur at any time and under any circumstances, puerperal or not; moreover, it has little or nothing to do with the uterine system; it is generally very amenable to treatment, and is seldom fatal. Occasionally, however, it runs on to inflammation, and sometimes assumes a typhoid character; it is also occasionally seen in an epidemic form.

The *Symptoms* begin generally within a week after delivery, and very often there is a previous history of disordered bowels with constipation; but as soon as the disease sets in, which it occasionally does with slight rigors, there is diarrhœa, the evacuations being of a dark, lumpy, exceedingly offensive, and unhealthy character. "At times they appear to consist of minute membranous shreds, floating in dark-brown water; in others they are clay-colored, slimy, adhesive, excessively offensive, and even pungent; whereas, in others, they seem to consist chiefly of dark, unhealthy bile, mixed with water and mucus." The tongue is coated with a dirty white, more rarely dry and brown fur, occasionally with red tip and edges. There is headache, loss of appetite, lassitude, and oppression. The skin is tinged with a yellow hue, there are griping and colicky pains in the abdomen, flatulence, and occasionally tenderness, the breath is exceedingly offensive, the pulse quick and full, 120 to 140, and there is often a good deal of inflammatory or irritative fever, which assumes more or less a remittent character; vomiting is of rare occurrence. The secretion of milk is not much affected, but the lochia are generally diminished.

Dr. Churchill gives the following as the chief *diagnostic* points in an epidemic of this kind, which he witnessed some time since:

"I had undoubtedly to deal with a severe attack of intestinal irritation, as was shown by the pain, its fluctuations in seat, and its paroxysmal character, and which was confirmed by the occurrence of diarrhœa. So far was clear; but then arose the question as to whether there might not exist enteritis or peritonitis; and some support to this view was afforded by the rigor, the quick pulse, and the tenderness; but then the pain was shifting and paroxysmal, which is not generally the case in these diseases, and the tenderness was superficial, and not increased by prolonged pressure. Add to this that the decided improvement in the course of twenty-four hours negatived such a supposition. There then only remained the question of how far the uterine system was involved; and as I found no particular tenderness over the uterus and no enlargement of that organ; that the lochia, if modified for a few hours, shortly resumed their natural character; and lastly, that the secretion of milk was abundant and unchecked, I came to the conclusion that the uterine system was unaffected, that no inflammation existed in the peritoneal serous membrane or in the intestines generally, but that the attack was one of severe irritation of the gastro-intestinal mucous membrane, accompanied with high fever, from some unexplained cause."

The *post-mortem appearances* have generally direct reference to the intestinal irritation. Thus, occasionally, if the diarrhœa has been very profuse, there are seen small patches on the mucous coat of the bowel, softened and even ulcerated; sometimes the intestines are highly congested, at others pale and exsanguine; if any inflammation has existed during life, the appearances will be the same as in the other inflammatory forms, though generally of less extent.

The *Treatment* is happily, if begun early and judiciously conducted, successful; where it is neglected the symptoms assume a typhoid character, and are, of course, of more serious import. Generally, the first thing to be done is to unload the bowels, and nothing is better for this purpose than an enema of gruel and castor oil, followed by a small dose of the latter with 20 or 30 drops of laudanum to relieve the colicky pain, which is probably caused by the bowel being thrown into a state of spasm from the irritation of offending excretions. Sulphuric ether, henbane, and camphor mixture will also materially assist in this, and much relief is often experienced by the application of a warm fomentation, a hot linseed poultice, or a hot hip bath. If the skin has a yellow tinge, and the system appears to be surcharged with bile, I know of nothing which so well relieves this condition, whether in the puerperal or non-puerperal state, as a quarter or half a grain of podophyllin, with one or two grains of the extract of colocynth; it is surprising often the amount of bilious material which this will bring away; it may be repeated again and again if necessary. Some prefer mercury in the form of calomel or gray powder for the same purpose, following it up with a few doses of rhubarb and aromatic confection. "I am now thoroughly persuaded," says Dr. Hamilton, "that the full and regular evacuation of the bowels relieves the oppression of the stomach, cleans the loaded and parched tongue, and mitigates thirst, restlessness, and heat of surface; and that thus the latter and more formidable impression on the nervous system is prevented, recovery more certainly and speedily promoted, and the danger of relapsing into the fever much diminished." If inflammation supervenes, it is to be treated in the usual way, and until this is done, the purgative treatment must be suspended.

Should the disease assume a typhoid character and be accompanied with much exhaustion, stimulants should at once be given in the form of ammonia, wine, and brandy; opium with chalk, or starch and opium enemata, will be useful in checking diarrhœa; and the flatulence which is often so troublesome will be relieved by turpentine.

IV. FALSE PERITONITIS.

Under this title writers have described an affection which is occasionally met with in puerperal women, characterized by more or less severe, or apparently severe, abdominal pain, and the chief interest of which is the liability of its being mistaken for a more serious disorder. It is, however, quite independent of inflammatory action, and does not appear to be in any way connected with the peritoneum. Probably it is an entirely neurotic affection, resembling somewhat the disease known as pleurodynia. Dr. Rigby thought that its seat was either in the abdominal muscles themselves, or in the muscular coat of the intestines. Dr. Gooch was, I believe, the first to recognize this affection, and to point out its true character and the treatment most suitable to it.

It occurs mostly in women of delicate and nervous habit, and is frequently met with in hysterical persons. The pain is often apparently of the most excruciating character, and is greatly aggravated by any movement of the body. So distressing is this pain that persons will sometimes become almost frenzied with it; they are quite incapable of bearing even the slightest touch with the hand or the weight of the bed-clothes on the body; but that which marks its strongly nervous or hysterical character, and serves at once to distinguish it from the truly inflammatory pain, is that if the patient's attention be distracted by conversation or other means from the seat of pain, pressure, even to a considerable extent, if gradually and cautiously applied, will be borne not only without complaint, but apparently without her knowledge; but no sooner is her attention again drawn to it than the same exquisite sensitiveness reveals itself, and she screams out lustily even at the approach of pressure. Again, "if by soothing words and promises of cautious proceeding we induce her to let us apply our hand upon the abdomen so gently that it does not even rest its weight upon it, we shall find that we may now gradually increase the pressure, until, by degrees, it becomes considerable, not only without her feeling any increase of pain, but with complete relief, the pressure of the hand appearing, as it were, to benumb the pain. If we withdraw the hand in the same gradual manner no pain will be produced, but if we remove it suddenly, a spasm of the muscles, with intense pain, is instantly excited" (*Rigby*).

With all this there is often a great show of constitutional disturbance, though it is all of the same evanescent character; the tongue becomes dry, the pulse quick, small, and jerking, the skin is hot but mostly covered with perspiration, and the mental excitement is often very great. If the disease be recognized and judiciously treated it seldom leads to any mischief, but if neglected, or if the symptoms are erroneously interpreted, it "soon passes either into acute peritonitis or into the typhoid state of the malignant form, the latter transition being almost certain if the practitioner has considered it as an inflammatory affection, and treated it antiphlogistically."

There is generally little or nothing discoverable after death, unless the disease has become complicated with some other affection; but, as before said, such a termination is extremely rare, and therefore the opportunities of observing its effects are very infrequent.

"Most of the patients who were the subjects of these attacks were women who in their ordinary health were delicate and sensitive; the attack sometimes seems to originate in violent afterpains, gradually passing into permanent pain and tenderness resembling inflammation or the painful operation of a powerful purgative, but it could sometimes be traced to no satisfactory cause: the patient had had a common labor, and had experienced no unusual cause of debility or irritation" (*Gooch*).

Treatment.—As a general rule the treatment of this affection is sufficiently simple, and on the whole very successful, if judiciously carried out; but a mistaken estimate of its true character may lead to very disastrous consequences; for while in many of its features it strongly resembles puerperal peritonitis, no worse error could be made, at least by those who practice antiphlogistically, than by adopting in this case the treatment recommended for that disease. It would be as mischievous to treat such a case with the lancet as to bleed a person for convulsions due to anæmia. Opiates, warm fomentations, and tonics, as recommended by

Gooch, are the remedies to be adopted; to which may be added, if there be any depression, some stimulant, as the aromatic spirit of ammonia, gum camphor, and tincture of lavender. The bowels must at the same time be gently opened, care being taken not to give any purgative which shall cause griping; castor oil is perhaps the best. The diet should be light, easily digested, but at the same time very nutritious; a little wine will often be beneficial. "With spirit-drinkers, the loss of their daily stimulus is almost sure to be followed by a low, feeble, irritable state of the system, much gastric and nervous derangement, and the paroxysms of pain just described. It is astonishing how quickly every symptom subsides and the system returns to a natural condition by the daily allowance of a small quantity of their favorite beverage."

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